INTERACTION INVOLVEMENT IN CROSS-CULTURE COMPUTER-MEDIATED COMMUNICATION: EXAMINATION OF A COMMUNICATION PROCESS IN DYADIC INSTANT MESSAGING CONVERSATIONS

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

By

Thi Thao Duyen Nguyen

August 2013

INTERACTION INVOLVEMENT IN CROSS-CULTURE COMPUTER-MEDIATED COMMUNICATION: EXAMINATION OF A COMMUNICATION PROCESS IN DYADIC INSTANT MESSAGING CONVERSATIONS

Thi Thao Duyen Nguyen, Ph.D.

Cornell University 2013

This dissertation explores how participants express and interpret verbal cues of interaction involvement in dyadic conversations via text-based Instant Messaging (IM). Moreover, it seeks to discover differences in the way American participants and Chinese participants use verbal cues when they are highly, or lowly involved. Based on previous literature, interaction involvement is defined as a communication process variable, fluctuating during the social interaction under the influence of various individual and contextual factors such as the task workload, the communication style of the participant, or the communication media. I conducted two studies to test my hypotheses and research questions. The first study examined how American, and Chinese participants used verbal cues to express involvement in dyadic, text-only, IM conversations. I conducted experiments with pairs of American, and Chinese students discussing a business proposal. In this discussion, I manipulated the participants' level of involvement using a distraction task. I found that the use of personal pronouns, assent words, cognitive mechanism words, and definite articles were a significant indication of the participants' level of involvement in an IM conversation. Moreover, interaction involvement influenced cognitive and affective processes such as mutual understanding, emotions, and satisfaction in computer-mediated conversations. The second study examined how verbal cues of involvement, namely, the frequency of personal pronouns, and assent words, are perceived and interpreted by participants. I conducted an online survey in which participants had to watch four

recordings of four different IM conversations between two students, who used different numbers of personal pronouns, assent words, and total number of words. I found that the use of personal pronouns and assent words affected the participants' evaluation of the students' involvement. Moreover, it influenced the participants' perception of the students' annoyingness, and the general experience the participants reported if they had been asked to work with these students. I discussed the implications of the results from these two studies to theoretical developments in computer-mediated, interpersonal, and intercultural communication research, as well as practical applications to the design of team collaboration tools. I concluded with future directions to advance research about interaction involvement and its impact on the communication process.

BIOGRAPHICAL SKETCH

Duyen (Mary) Nguyen (Vietnamese: Nguyễn Thị Thảo Duyên) was born in Hue city, Thua Thien Hue province, Vietnam. She attended Quoc Hoc, Thua Thien Hue's best, and one of Vietnam's most selective high schools, where she exceled in the study of foreign language, and won several awards in national competitions of English. Duyen pursued a Bachelor degree at the School of Computing, National University of Singapore, where she continued to distinguish herself with the Dean's List Award for meritorious academic performance in 2005. After graduating with a Bachelor of Computing, Honors track, Second class, Upper division in 2007, she worked as a software engineer in the burgeoning Information Technology industry in Singapore. In 2009, she was admitted to the graduate program in Communication at Cornell University, with the Glass Family Graduate Fellowship, to study intercultural and interpersonal computer-mediated social interaction under the tutelage of Professor Susan Fussell. Continuing her undergraduate research, she conducted studies about the effects of technology, cultural values, and communication styles on various communication processes and behaviors, such as the development, expression, and interpretation of involvement in dyadic intercultural conversations. Her exceptional research productivity and excellent academic record earned the Anson Rowe Award for Outstanding Advanced Graduate Student from the Department of Communication in 2012. In the same year, she obtained a Master of Science in Communication, and is now a candidate for a doctoral degree. She will join the Human Computer Interaction Institute at Carnegie Mellon University as a post-doc researcher in September 2013.

To Tien, Dad, Mom, and Guigo

ACKNOWLEDGEMENTS

I would like to express my gratitude to my advisor, Sue Fussell. Sue has been a wonderful teacher, a caring and inspiring mentor, an efficient and considerate colleague, and most of all a great role model for doing rigorous, impactful academic research, as well as for living a meaningful life. Sue never ceases to provide support for her students, and cares about both their academic progress and their personal lives. The idea for this dissertation was incubated and nurtured through my many discussions with Sue, when she challenged me to venture outside my comfort zone, exploring research topics few scholars have tried before. Most importantly, Sue always encourages me to think critically and to be self-confident. Sue's serious attitude, rigorous methodology, and profound theoretical understanding deeply influence, and motivate me in my current, and future research. I am also indebted to my committee members, Jeff Hancock, Natalie Bazarova, and Qi Wang, who have given me a lot of supportive feedback and insightful comments, as well as challenged me to expand my thinking.

I would be remiss if I didn't acknowledge my colleagues, and fellow graduate students, especially in the Intercultural Communication Lab: Prof. Hao-chuan Wang, Prof. Dan Cosley, Leslie Setlock, Jin Liu, Tina Yuan, Nanyi Bi, Nitesh Goyal, Ge Gao, & Bin Xu for their valuable feedback during many lab discussions leading to this dissertation. A special thank goes out to Leslie Setlock, and my undergraduate assistant Andre Anderson for their help with data collection. I also want to thank the wonderful administrative staff at the Communication department: Danielle-Dean Manzer, Joanna Alario, Emily Drew and Ann Bianchi for their help with paperwork and the logistics involved in conducting the two dissertation studies.

Most of all, I am grateful to my husband, Tien Nguyen, my parents Hung Nguyen & Thuan Tran, my brother Thai Hoa Nguyen (Guigo), my cat Alexandria, and my dear friends at

Cornell for their practical, as well as emotional support during the dissertation process. Tien – you are my best friend, my love, and my endless source of encouragement, consolidation, comfort, distraction, and inspiration for the past 10 years, especially, during my graduate program. I am blessed to have a husband who shares with me, not only the ups and downs of daily life, but also the scientific curiosity, research ideas, and interest in statistical analysis. Dad, Mom, Guigo – although we are apart, you have never failed to cheer me up, and get me back on my feet when I was lost, frustrated, homesick, or stressed. Lexie, my feline baby – you and your omnidirectional cuteness always put a smile on my face even in the most desperate situations. Minh Chau and Thuy Tien, my dear friends at Cornell – thank you for the many car rides, dinners, hugs, laughter, tears, and cheers when I needed them the most. Caisy, my undergraduate thesis supervisor – thank you for recognizing my academic potentials, shaping my research interest, and supporting my application to the PhD program at Cornell. I am grateful to you all.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Interaction involvement is often defined as the extent to which participants are immersed and engaged in the ongoing social interaction they are currently partaking (Goffman, 1967, Coker & Burgoon, 1987). By this definition, interaction involvement is a key aspect of any social interaction. Lack of involvement, or "alienation from interaction" may incur uneasiness for all parties (Goffman, 1967), such as the unpleasant sentiment in the familiar phrase "like I'm talking to myself". Involvement is one of the "basic yardsticks" for people to interpret and evaluate all messages in their environment; especially relational messages that help them make sense of, negotiate and develop relationships with others (Burgoon & Hale, 1967). Involvement in conversations is thus especially important to teamwork, as the level of involvement of a team member in meetings influences other teammates' impressions of him or her, their interpersonal relationships, and their willingness to collaborate (McLeod & Kettner-Polley, 2004). Understanding how involvement is conveyed and perceived in task-oriented conversations is therefore important to improving work-team performance and fostering team harmony.

Nowadays, advances in communication technologies enable human to interact with each other at a distance via computer-mediated environment such as email, discussion board, or Instant Messaging (IM). Remote, distributed team collaboration, therefore, are also facilitated with computer-mediated communication (CMC). While there have been many studies about interaction involvement in communication, most previous research examined involvement in traditional face-to-face settings. There has been little research about how interaction involvement is perceived, understood, and expressed in CMC. The traditional face-to-face settings afford non-verbal and paralinguistic cues about involvement such as tone of voice, pitch, facial expression,

and gaze, which have been showed to be important for the expression and interpretation of involvement (Coker & Burgoon, 1987). CMC, such as text-only messaging or discussion forum, may not offer such visibility, and audibility. Even with the support of video and audio conferencing, certain important non-verbal involvement cues may still be lost, such as gaze, proximity, or body orientation. Research about relational CMC, such as the Social Information Processing (SIP) Theory by Walther (Walther, 1996), and studies on language use in CMC (e.g. Herring, 1999), have implied that people are able to adjust to, or even take advantage of the constraints, as well as the new capacities offered by CMC (e.g., Walther & Burgoon, 1992) to convey, emotional, social and relational cues, which includes conversational involvement. But few studies have elaborated on how people adapt their communication behaviors, or verbal styles to express their engagement in a conversation to a partner in text-based environments, or to derive how involved their partner is.

Moreover, studies in face-to-face interaction have shown that interaction involvement greatly influence other communication processes and outcomes, such as affiliation, and persuasion (Coker & Burgoon, 1987). Therefore, it is also important to investigate the role of interaction involvement in CMC, how it influences other cognitive and affective processes and outcomes, such as understanding, and emotions of all the speakers participating in the conversation. The goal of this dissertation is to answer these questions, by identifying the specific verbal cues that people rely on to convey involvement in a text-based, computer-mediated conversation, such as in IM. In addition, it also analyzes the role interaction involvement play in people's comprehension and enjoyment of their computer-mediated conversation, as well as the emotions they feel towards their interaction partner.

Another area of research about interaction involvement that is under-developed is how cultural differences in communication styles may influence the expression and interpretation of interaction involvement. In this dissertation, I investigate cultural differences among participants who are native to different regions of the world, namely, North Americans, and East Asians. Cooperation between North American and East Asian, especially between American and Chinese teammates is becoming more popular, and important for global development in different fields nowadays. In addition, cross-cultural studies have found that North American and East Asian participants differ significantly on many cultural values and aspects, such as individualism vs. collectivism, or communication style. As Hall (1976) has observed, North American people tend to have a low-context communication style, which is direct, to-the-point, with little attempt to mask one's emotions, while East Asian people tend to employ a high-context communication style, relying on the socio-contextual cues such as non-verbal behaviors, facial expressions, and the relationship between the speakers for the expression and interpretation of meaning (Gudykunst et al., 1996). People from different cultures also differ in terms of the focus they place on different functions of communication. North American people tend to be task-oriented, and place priority on exchanging information and finishing the task at hand. East Asian people on the other hand tend to be relationship-oriented, and also emphasize the importance of building rapport and harmony with their partner apart from task completion (Walls, 1993). Studies by Burgoon and collaborators (Coker & Burgoon, 1987; Burgoon & Hale, 1984) have uncovered interesting non-verbal communication behaviors that signal interaction involvement in a conversation. Their experiments, however, employed samples of college students from North America. As Norton (1983) & Cappella (1983) proposed, the enactment of involvement in conversation are influenced by one's communication style, and the cultural norms of

communication behaviors. With the culture differences in communication styles mentioned above, the results about the non-verbal indicators of involvement from Coker & Burgoon (1987) may not apply in a high-context, relationship-oriented, East Asian culture. An example is that a forward lean may be used to indicate involvement in one culture, but perceived as an attempt to dominate in another. So far, there have been only a few studies that looked into interaction involvement in different cultures (e.g. Chen, 1995). These studies, however, did not directly examine the enactment and perception of interaction involvement in different cultures. This dissertation addresses this question more directly, exploring how various verbal involvement cues in CMC are used differently by North American, and East Asian participants when conversing via Instant Messaging.

In summary, this dissertation aims at bridging these theoretical and empirical gaps by exploring how people from different cultures, namely North America and East Asia, perceive and express interaction involvement when conversing via Instant Messaging. Based on previous perspectives toward interaction involvement, this research views interaction involvement as a flexible, adaptive communication process, evolving throughout the interaction depending on various contextual factors such as relationship between speakers, the topic of the conversation, or the larger social situation that the conversation is embedded in (Goffman, 1967; Cappella, 1983). I conducted two studies addressing the research questions from different perspectives. In the first study, I conducted experiments in which pairs of American and Chinese participants conversed to complete a decision-making task together only via text-based IM. During their conversation, I manipulated their level of involvement using a distraction task, so that there would be periods of the conversation when the participants were highly involved and lowly involved. Participants responded to a short survey questionnaire about their level of involvement and other

communication processes at different points during their conversations. I found that the frequency of personal pronouns, definite articles, assent words, and cognitive mechanism words are important for the expression of high or low involvement. I also found that American and Chinese participants tended to rely on different verbal cues (definite articles for American, and cognitive mechanism words for Chinese participants) to convey involvement. Lastly, I found that the level of involvement of the participants influence the outcome of other communication processes, such as the level of mutual understanding of both conversational partners, or their emotional experience. In the second study, I collected responses to an online survey, in which participants watched 4 recordings of 4 different task-oriented IM conversations between two students. The IM recordings were recorded from the perspective of one of these two students, whom I call the first student. The other students, who received messages from the first students and responded, were called the target communicators. In these recordings, I varied the number of personal pronouns, assent words, and total number of words said by the target communicator. I found that the number of personal pronouns and assent words a speaker said influenced the evaluation made by a third-person observer for this target communicator, in terms of the his or her understanding, and the emotional, and general experience one would feel interacting with him or her.

This dissertation contributes to the literature in three areas: the studies of interaction involvement as an important communication process, the bourgeoning, promising research about conversations and discourse in CMC, and the interesting area of research about intercultural communication. First, for the research about interaction involvement, this dissertation strives to overcome the drawbacks of both the current two approaches to measuring involvement. The first approach is Cegala's measurement of involvement as an unchanging trait, independent of

conversational context (Cegala, 1981). The second approach is behavioral, measuring involvement based solely on the frequency or intensity of certain communication behaviors such as gaze or facial expressions. Instead, in this dissertation I measured interaction involvement not only through communication behaviors (the frequency of verbal cues used), but also by cognitive responses (using self-reported answers to Cegala's Interaction Involvement Scale items). Moreover, this research also explores how interaction involvement interacts with other communication processes during an interaction, such as emotions, or comprehension. Second, regarding the CMC literature, this dissertation extend our knowledge about the effects of communication media on communication processes, specifically how the affordances of the communication tools restraint or broaden the human communication capabilities, and how they shape our communicative adaptation. This study is a direct extension of the proposition made by SIP theory about the potential of CMC in supporting relational communication. Moreover, while most CMC studies examined the effect of the communication media on outcome or behavioral variables, such as the level of intimacy, task efficiency, or the language and grammar used in conversations, this dissertation explores one of the communication processes underlying communication behaviors, and directly influencing the outcomes of communication. Interaction involvement is a process that has received little attention in CMC research. Third, regarding the intercultural communication literature, this dissertation deepens our understanding of cultural difference in communication styles. While previous studies rely on value surveys to distinguish high vs. low context culture, or relationship vs. task-oriented culture, this study examined culture differences at the level of communication behaviors as displayed by North American and East Asian participants during a conversation.

The findings from this dissertation also carry practical applications. Mediated communication is rapidly growing in popularity nowadays with the development of communication and information technologies. Instant Messaging provides a quick and easy solution for geographically dispersed collaborators who cannot afford the costs of organizing face-to-face meetings, especially people from different cultural backgrounds. The findings from this dissertation suggest design features for Instant Messaging and other communication tools to improve mutual understanding, satisfaction, and enjoyment of cross-culture participants during their conversation, despite the lack of audio and visual cues, thus also enhancing the human experience of computer-mediated communication.

This dissertation begins with this introduction chapter, followed by an overview of the theoretical framework based on which I formulate my research questions and hypotheses in Chapter 2. This chapter introduces the literature about interaction involvement and its role in the communication process, as well as the cross-culture communication literature about cultural differences in communication style in general, and in interaction involvement. The review of the literature is followed by a description of the two empirical studies testing the expression, and perception of involvement in IM conversations across cultures, as well as the effect of involvement on the level of understanding, the feelings participants experienced, enjoyment of the conversation, and liking of the partner. I present the research questions, hypotheses, method, results, and discussion of study 1 in chapter 3, and of study 2 in chapter 4. Lastly, I conclude with chapter 5, which summarizes the findings from study 1 and 2, provides a general discussion of their results as a whole, details the contributions, limitations of the studies, and proposes directions for future research on the same topic.

CHAPTER 2

THEORETICAL BACKGROUND

As mentioned in the introduction, there are three important goals for this dissertation: 1) to study the expression and interpretation of involvement in text-based CMC, 2) to examine the relationship between interaction involvement and other communication processes, and 3) to explore cultural differences in the use of involvement cues in CMC. Therefore, this chapter first provides an introduction to the various perspectives and approaches towards conceptualizing interaction involvement by communication scholars. Next, it reviews the findings from studies about language use in CMC related to involvement, specifically, the linguistic styles people adopt to express emotions, involvement, and affiliation in text –based communication channels such as blogs, Instant Messaging or emails. Then it introduces the first 6 hypotheses and research question 1 based on the literature. Next, it provides a review of the literature about the effects of interaction involvement on other cognitive and affective communication processes such as conversational grounding, and communication outcomes such as enjoyment, or affiliation, and present hypotheses 7 and 8, and research question 2. Lastly, it presents the cross-culture communication literature about cultural differences in communication style in general, and in interaction involvement, and based on this, research question 3.

Defining Involvement – The Duality of the Construct

Interaction involvement is an interesting but complex construct that has captured the attention of various communication researchers, due to its key role in communication performance and relationship building. Several researchers have defined, operationalized, and measured interaction involvement under different perspectives. The various conceptualizations

of interaction involvement can be distinguished based on two dimensions: the relationship between involvement and the general communication process, and the nature of involvement as a measurable variable. First, early studies about interaction involvement differed on the basic characteristic of involvement as a communication construct. While some scholars viewed interaction involvement as a trait, a stable characteristic of the communicator that influences communication processes, other viewed interaction involvements as a communication process itself. Both conceptualizations of involvement have advantages and drawbacks. However, for this dissertation, I choose to define involvement as a process. In the next three sections, I will explain the reason why by providing a brief description of both approaches, and point out their strengths, weaknesses, and suitability to the research goals of my dissertation.

Involvement as a trait. One of the prominent research thrust about involvement is the work of Cegala and colleagues on interaction involvement as a trait measure. Cegala (1981) defined interaction involvement as the dedication of an individual's consciousness towards all the parties involved in a social interaction, including oneself. The major issue remains how such focus of cognitive effort may be measured and studied. Cegala proposed two ways the dedication of attention to the interaction would manifest. First, focus on the interpersonal interaction would help the actor account for and interpret others' behaviors as well as be aware of the way others is perceiving oneself. This ability to assign appropriate interpretations upon others' behaviors and to be cognizant of how others interpret one's own behaviors is called "perceptiveness". But in addition to perceptiveness, being involved in an interaction also includes the knowledge of what is going on during the interaction, and the attention to the specific relationships of oneself and one's partners in the context of the interaction. This was what Cegala (1981) termed "attentiveness". Thus according to Cegala (1981), interaction involvement can be studied as the

"*general tendency for an individual to demonstrate both attentiveness and perceptiveness in interactions*" (page 112). Cegala (1981) constructed the Interaction Involvement Scale (IIS), consisting of 18 items related to the concept of perceptiveness and attentiveness (e.g. "I am keenly aware of what happened during a conversation", "Often I am preoccupied in my conversations and do not pay complete attention to others"). A later study by Cegala, Savage, Bruner and Conrad (1982) reexamined these items and discovered a third factor *responsiveness*. This factor included items measuring the tendency of respondent to know how to perceive, interpret and respond accordingly to other's behaviors in an interaction.

As a trait measured by the IIS, interaction involvement appeared to correlate highly with other personality traits such as extraversion or openness in Cegala's studies about the IIS (Cegala et al., 1982). While theoretically plausible, there has not been adequate empirical evidence to the distinction between interaction involvement and other common personality traits and psychological variables. Another major issue with Cegala's approach is the validity of the measurement of interaction involvement that he proposed and used. The IIS has not been checked for convergent validity. The three separate factors in both Cegala (1981) and Cegala et al. (1982) were not simultaneously compared against a measure closely related to the real definition of interaction involvement as proposed by Cegala, which is the focus of consciousness in an interaction. Since Cegala (1981) viewed interaction involvement as a performance-based variable, he tested how the composite score of interaction involvement measured by the IIS accounted for the variance in communicative performance. The performance measure in that study, the amount of information a participant can extract from interviewing a partner, was, in a sense, used to check the scale's validity. However, such performance measure still did not reflect directly what Cegala defined as interaction involvement. In addition, while Cegala et al. (1982)

used correlations and regressions with the common personality traits to check the construct validity of his scale, the significant correlations between the factors of the IIS also called for a discriminant validity check, which was not carried out in Cegala's work.

Cegala and his collaborators viewed interaction involvement as a cognitive variable, but a somewhat stable, unchanging trait independent of the context of the interaction (Cegala, 1981), instead of a communication process that varies under the different forces that act on a conversation, such as the relationship between the speakers, or the socio-emotional context. Thus, such a definition is not suitable for the study of the expression and interpretation of involvement in CMC, as the important roles of the participants' language use, and of the communication medium are ignored by this definition. Moreover, given the high correlations among the factors of Cegala's measurement and other personality traits, and the lack of evidence for convergent and discriminant validity of the factors, it is difficult to justify the distinctiveness of the construct that Cegala defined and measured as involvement. This limits the contribution of Cegala's approach to the study of interaction involvement as a cognitive, and communicative process, as my dissertation proposes. Next, I will turn to the second approach that defines involvement as a communication process variable.

Involvement as a communication process. Unlike Cegala, Capella (1983) proposed the term "conversational involvement" as a dynamic process variable, fluctuating during the course of interaction, under the influence of the conversational partners. Coker & Burgoon (1987) defined Cappella (1983) concept of "conversational involvement" as "the degree to which relational partners express attentiveness, interest, and accessibility toward one another, ranging from highly non intense to highly intense involvement". Notice that this definition of involvement is similar to Cegala's definition of involvement since both refer to the intensity of

activity and effort dedicated to a social interaction. However, while Cegala was interested in the more or less stable ability of individual to become involved in the interaction, Cappella investigated the fluctuating level of involvement as it progressed during the interaction. While Cegala's definition of interaction involvement is a trait that cannot be transmitted from one to another in an interaction, Cappella, later on in his chapter, went on to model the process of involvement development in conversations, whereby involvement is "transmitted" between the two partners in a conversation. Cappella posited that partners in a conversation may or may not adjust their level of involvement in response to the involvement expressed by the other person. He proposed 6 paths the process of involvement development in any dyadic conversations between person A and person B may take, based on how A and B's level of involvement change with each other. In response to person A's increase or decrease of involvement, person B may also increase, decrease or remain the same level of involvement. On the other hand, when a person tries to adjust the level of involvement in the opposite direction of his or her partner (e.g. by decreasing involvement when the partner is increasing), that person is said to "compensate" their partner. This model however lacks the case when both A's and B's level of involvement remains the same in the conversation.

Patterson (1982) on the other hand viewed interaction involvement expressed through non-verbal behaviors, or what he called "non-verbal involvement", as having both stable, "standing features", and dynamic features that changes during an interaction. Standing features, according to Patterson, included such non-verbal behaviors as distance, body orientation, and posture. These standing features stayed rather consistent during an interaction, and set a lower and upper limit for the level of involvement expressed in that interaction based on the social context. For example, two closed friends conversing with each other usually keep a closer

distance to each other than two strangers; and these distances remained more or less the same throughout the interactions. In contrast, the dynamic features such as gaze or facial expressions change throughout the course of the interaction, and have influences on the communication processes. For example: a confused facial expression on the listener implies that the speaker needs to provide further explanations. As a whole however, Patterson's sequential model of non-verbal involvement still considers involvement as dynamic and changing from context to context, from interaction to interaction, similar to Cappella's concept of conversational involvement. This model takes into account the effects of stable, trait-like, context-dependent antecedents such as personality, experience and social-relational factors, and the influence of pre-interaction mediators such as behavioral predisposition on the development of non-verbal involvement during an interaction. However, instead of describing how involvement changes throughout an interaction like Cappella's model, Patterson's model was more concerned with the cause and effects of involvement changes.

Cappella's and Patterson's model of interaction involvement as a process more closely reflect Goffman's (1967) idea of involvement, in which the level of involvement itself fluctuates during a social interaction. Moreover, involvement needs to be maintained or adjusted during the process of a conversation. In accordance with this conceptualization of interaction involvement as a process variable, Cappella (1983) proposed indirect measurement of involvement based on the behavioral (verbal and non-verbal) indications, including features of the spoken word such as loudness, speech rate, latency, duration of vocalization and pauses, gaze, proximity, and other body movements. This approach is consistent with the definition of Cappella's conversational involvement given by Coker & Burgoon (1987), which conceptualized involvement based on its

expressions and manifestations during the interaction instead of on intrinsic individual ability. This implies that involvement and its verbal and non-verbal indications go hand in hand.

Cappella's suggested operationalization of involvement resembled Patterson's (1982) view of involvement as defined through communication behaviors. Patterson (1982) proposed the concept of "non-verbal involvement behaviors", defined as the "set of behaviors operationally defining the degree of involvement manifested between individuals in a social setting" (page 233). He suggested a list of these behaviors, including interpersonal distance, gaze, touch, body orientation, lean, facial expressiveness, talking durations, interruptions, postural openness, relational gestures, nods, and paralinguistic cues. According to him, increase in the frequency and intensity of these behaviors indicated increase in involvement, and vice versa.

This suggested way of operationalizing interaction involvement helps to measure the variation of involvement during a conversation, as well as takes into account the important role of internal and external factors, such as the communication task, or the communication medium in shaping, and affecting the behavioral manifestation of involvement. This is the reason why I adopt this conceptualization for my dissertation. However, these models are not without flaws. They fall short of the crucial characteristic of interaction involvement as a cognitive variable, and not just a behavioral variable. As discussed at the beginning of this paper, intrinsic in the definition of interaction involvement is the focus of cognitive processing on the ongoing conversation. While the level of cognitive processing may change during a conversation, and may differ from one conversation to the other, such change may or may not manifest into communication behaviors such as eye gaze or facial expressions. Some communication behaviors are used to express more than just involvement, and thus it is difficult to know whether

the change of involvement, or some other affective or cognitive factor actually caused these behaviors. Moreover, cultural norms regarding communication, such as the distance between speakers, or hand gestures, also influence how involvement is acted out in conversations (Norton, 1983). The relationship between the emergence and variation of communication behaviors and interaction involvement is complex, and deserves separate in-depth examination.

The Definition and Measurement of Interaction Involvement in This Study

Interaction involvement is a commonly used, widely studied, ostensibly straightforward, but actually complex concept. In the last two sections I have reviewed the two approaches to conceptualize and measure interaction involvement. I have also demonstrated that both approaches have their advantages and drawbacks, and both require further fine-tuning so they can reflect more accurately the intended nature of the concept. Involvement has a great impact on various aspect of social interaction, from discourse strategies, cognitive and affective processes in communication, relationship building, to task performance. The study of interaction involvement therefore promises great insights into the human communication process, as well as the various psychological, interpersonal, and social implications of communication. The purpose of this dissertation is to examine how people from different cultures detect, express, and interpret different levels of involvement in computer-mediated conversations. Given these objectives, interaction involvement in this study is considered as a communication process, consistent with Cappella, and Patterson's approaches. Involvement levels fluctuate during the conversations, and are expressed by different verbal and non-verbal cues. More importantly, the involvement of each speaker in a conversation is influenced by various factors internal, and external to the interaction. This implies that by adjusting certain conversation factors such as peripheral conversational tasks, or partner's communication behaviors, we can manipulate the level of

involvements of a speaker. One way to study the relationship between the level of involvement and verbal cues indicative of involvement in a conversation is to manipulate the level of involvement of a speaker and examine how the behaviors of that speaker changes. I intend to do just that in this study.

As discussed previously, one drawback of the approach towards involvement by Cappella or Patterson is that previous studies defining interaction involvement as behavioral usually employed verbal and non-verbal manifestations of involvement, such as the number of words, the tone of voice, pitch, gaze, body gestures as measures of involvement. Characterizing interaction involvement based entirely on communication behaviors as Cappella, Patterson, Burgoon and other scholars suggested may miss the important nature of interaction involvement as a cognitive process. Such studies so far have only been able to identify non-verbal behaviors associated with involvement, while not testing a direct measurement of involvement. The association between communication behaviors and interaction involvement is complex, as the results of various studies have shown. Such complex association calls into question the validity of using communication behaviors to represent involvement. The results of these studies are also confounded by social norms and cultural values regarding involvement of the participants. The current approaches could not be applied well into other communication environment besides face-to-face interactions.

This dissertation study seeks to address these shortcomings. First, instead of measuring involvement using communication behaviors, I manipulate involvement by adjusting factors affecting the dynamics of the conversation, such as communication tasks, and examine the relationship between involvement and communication behaviors. Second, I measure involvement at different point during the conversation using questionnaire items to verify both the

manipulation, and the relationship with communication behavioral variables. Third, I attempt to account for the effect of social norms and cultural values on communication behaviors related to involvement by studying participants from different cultures. And last but not least, I investigate computer-mediated interactions, with the objective of adding to the current literature about involvement in face-to-face conversations, to uncover the deeper-level mechanism by which involvement in conversations is developed and maintained, regardless of communication media. In the next section, using this definition, and operationalization of involvement, I will review the theoretical background on the expression and interpretation of interaction involvement in conversations, its interaction with other communication processes, and the cross-cultural studies about involvement.

Involvement and Other Communication Processes

As discussed in the last sections, previous communication scholars suggested a definition of involvement as a process, and behavioral variables. They have also conducted various studies linking involvement with its behavioral cues (e.g. Coker & Burgoon, 1987). However, these studies focused on face-to-face interactions. There results pointed out a lot of non-verbal indicators of involvement, such as direct eye gaze, body orientation, or head nods. Not many studies investigated the verbal cues for involvement, and considered computer-mediated interactions where there may be a lack of visual or audio cues.

The development of communication technologies nowadays opens up new opportunities for people to connect with one another despite spatial and chronological distance. However, with these new opportunities come new concerns about the lack of social cues such as audio and video in certain computer-mediated environment, such as text-based Instant Messaging (Kiesler, Siegel, McGuire, 1984). While researchers in the old days found discouraging results about

relational communication in these computer-mediated channels (Kiesler, Siegel, McGuire, 1984), Walther (1992) proposed Social Information Processing Theory (SIP), which suggested that it is possible for people to develop closed, intimate relationships through CMC, given adequate time for interaction, and number of messages exchanged. According to SIP, immediacy cues can be conveyed not only nonverbally, but also verbally (Walther, 1995; Walther, 1996). Thus, participants in CMC may be able to adjust their communication and linguistic styles to convey immediacy and affiliation even in text-based environments. This perspective of CMC inspires this dissertation. According to several communication scholars (e.g., Wiener & Mehrabian, 1968; Burgoon & Hale, 1987), involvement in social interaction is similar, or part of communication immediacy, which are behaviors that express directness and sensory engagement. This dissertation examines how people adjust their communication style, and use verbal cues to express and interpret involvement in text-based conversations, thereby extending SIP theory.

The expression and interpretation of involvement cues in CMC. Various studies have looked into the relationship between certain communication behaviors, especially non-verbal behaviors, and interaction involvement. A study by Burgoon, Buller, Hale, and de Turck (1984) found that participants interpreted high eye gaze, close proximity, forward body lean, and smiling of their partner to convey greater closeness; while low eye gaze, a distal position, backward lean and lack of smiling indicated greater detachment. To compliment these results in how people decode cues of involvement, Coker & Burgoon (1987) conducted an encoding experiment in which participants were asked to increase or decrease their level of conversational involvement in a mock interview with a partner. The results confirmed that greater involvement was displayed through greater immediacy, expressiveness, smooth interaction management,

altercentrism, and absence of anxiety. In addition, immediacy was communicated by direct body and facial orientation and gaze, forward lean, positive reinforce such as head nods, and smiles, and animated gesturing. Expressiveness was expressed with facial animation, vocal expressiveness (such as changes in intonation and rhythm at the right moment), and relaxed laughter. Good interaction management was manifested through fewer silences, shorter latencies, more body coordination, and more coherence speech. Altercentrism was conveyed via kinesic, proxemics, and vocalic cues of interest, warmth, and friendliness. Lack of anxiety was encoded with more composure, more vocal relaxation (such as clear and relaxed voice), and more vocal attentiveness. These results were later confirmed in Guerrero & Burgoon (1996). All the results from studies by Burgoon and colleagues helped explain how involvement is perceived, and is enacted through non-verbal behaviors.

In most CMC environments, however, these non-verbal cues are not supported. Without non-verbal cues, how do participants who converse in text-based CMC such as in Instant Messaging convey and interpret cues of involvement? How do they know whether their conversational partner is engaged or detached from the conversation? How do they express their disengagement, show their interest, or reciprocate their partner's level of involvement in the conversation? These questions have not been examined directly by CMC scholars, and will be the focus of this dissertation. However, there have been many studies about the verbal and linguistic styles of expressing and interpreting emotions, affection, and affinity in text-based CMC. Involvement, affection, and affinity are all different, but highly related facets of the concept of immediacy as suggested by Mehrabian (1967). These studies about immediacy cues in text-based CMC provide guidance to my examination of the use of verbal involvement cues.

First, Camden & Verba (1986) developed the *psycholinguistic engagement analysis* to infer the level of involvement of the speaker with the ongoing face-to-face conversation, based on three linguistic features of the speaker's speech: 1) the number of definite vs. indefinite articles, 2) the number of intensifiers (related to certainty words) vs. qualifiers (related to hedge words), and 3) the number of personal ("I", "we") pronouns vs. impersonal ("you", "they") pronouns. Such analysis was based on studies (e.g., Camden & Verba, 1986; Osgood, 1976) that found that definite articles such as "the", "this", "that" increases as a speaker becomes more cognitively involved with the topic of the (face-to-face) conversation, while indefinite articles such as "a" or "an" increases as the speaker becomes less engaged. Another study by Cegala (1989) about the linguistic components of interaction involvement found that face-to-face conversations between at least one highly involved speakers are characterized by a higher number of words expressing certainty (intensifiers such as "certainly", "definitely"), and a lower number of words expressing uncertainty, such as hedges (e.g., "probably") than those between lowly involved speakers. Moreover, highly involved dyads used more relational ("we", "us", etc…) pronouns, and fewer personal pronouns ("I", "me") than lowly involved dyads. This result is explained by the assumption that reference to the partner and the self as a unit to self-reference indicates cognitive and communicative engagement with the partner in the conversation.

These previous studies were conducted on face-to-face conversations. Moreover, Cegala (1989) conceptualized interaction involvement as a trait characteristic, representing the communication competence of the speakers, unaltered throughout the conversation. In this study, I examine the involvement of speakers as a process variable, fluctuating during the text-based IM conversation depending on various contextual factors, and thus can be manipulated by changing these factors, such as the cognitive load of the task. Despite differences between face-to-face

environment and text-based IM in terms of the affordances for various communication behaviors and contextual cues, the results of these studies provide a basis for analyzing the verbal indications of involvement in CMC conversations. Moreover, to understand the effect of different communication media on the expression and interpretation of involvement, it is important to test whether verbal cues for involvement that works in face-to-face environment will also work in IM. Therefore, based on the findings in these previous studies, I proposed the following hypotheses:

H1: Speakers in the high-involvement condition will say more certainty words that those in the low-involvement condition in a text-based IM conversation.

H2: Speakers in the high-involvement condition will say fewer hedge words that those in the low-involvement condition in a text-based IM conversation.

H3: Speakers in the high-involvement condition will say fewer personal pronouns (I, me, etc…) that those in the low-involvement condition in a text-based IM conversation.

H4: Speakers in the high-involvement condition will say more relational pronouns (we, us, etc…) that those in the low-involvement condition in a text-based IM conversation.

H5: Speakers in the high-involvement condition will say more definite articles (the, this, that, etc…) that those in the low-involvement condition in a text-based IM conversation.

H6: Speakers in the high-involvement condition will say fewer indefinite articles (a, an, etc…) that those in the low-involvement condition in a text-based IM conversation.

High immediacy was also characterized by high number of agreements. Scheerhorn (1991) argued that agreements are linguistic cues that reflect the speakers' regard for their partners, and serve as manifestations of their affection towards the partners. Jones, Gallois, Callan, and Barker (1999) suggested that agreements are cues of accommodation in

conversation. In other words, they signify how the speaker is trying to match, or diverge from the partner's opinion. Taken together, these studies suggested that agreements and are indicators of the speaker's attention and active processing of the partner's utterances. As attention to one's partner is one of the indications of involvement, I propose the following hypotheses.

H7: Speakers in the high-involvement condition will say more agreement words (yes, right, true, exactly, make senses, etc…) that those in the low-involvement condition in a text-based IM conversation.

Cognitive effort in a conversation can also be expressed by verbal cues such as the use of words indicating causation, thinking, reasoning, or speculation ("think", "assume", "because", "guess", "therefore", "opinion"). Previous studies, however, have not examined how participants use these cues when they are involved, or not involved in a conversation. Therefore, I ask the following research question:

RQ1: *How does the speaker's level of involvement influence his or her use words expressing cognitive mechanisms, such as thinking, reasoning, causation, or speculation?*

Effect of involvement on other communication processes in text-based CMC. Most studies about involvement in face-to-face environment found that that high level of involvement increased the quality of social interaction. Cegala (1984) found that high-involved participants were able to recall more multi-fact thought units than low-involved participants. Villaume and Cegala (1988) studied the difference in the discourse strategies to help maintain coherence in conversations of various pairs of characteristically high and low involved participants. They found that conversations of pairs with at least one highly involved speaker were more elaborated, and syntactically more complex with extended speaking turns. Highly involved speakers seemed to be aware of, and thus rely more on the general conversational context to make their

contributions appropriate and meaningful to the discussion. Their conversations seemed to be deeper with more thorough discussion of fewer topics. On the other hand, conversations with lowly involved speakers seemed to change topics frequently and lack in-depth development of topics. Consistent with these results, Villaume (1988) found that conversations of dyads consisting of at least one highly involved speaker were more in-depth, and that the participants were able to discern and rely on the deeper implications of their partners' utterances to make meaningful contributions to the talk. Villaume, Jackson & Schouten (1989 found that under varying degree of conversational uncertainty, the high-involved participants were still able to extend the subject in their conversation. However, the low-involved participants were only able to extend the subject when their partners made it clear for them. In other words, low-involved persons were dependent on the nature of the comments made by their partner to establish the direction of the conversation.

These results imply that highly involved speakers are more certain about the flow of the conversation, and the content of the conversational exchanges. While these previous studies were conducted in face-to-face environment, the analyses and the results regarding discourse strategies were based solely on the content of the messages exchanged in that conversation, without the non-verbal cues that mark the differences between face-to-face and text-based IM conversations. Therefore, I argue that such results provide a basis for hypothesizing about the impact of involvement on cognitive processes in IM conversations. I propose that:

H8: Participants who are lowly involved in the IM conversation with their partner will report lower level of understanding of the partners' utterances than those in the control condition.

In addition to the positive effect on cognitive processing, regarding the affective experience in communication, Cegala (1984) found that high-involved persons, as measured by the IIS, would experience more positive affect and ego strength in both unstructured conversations and negotiations. He also found that low-involved persons experienced greater negative affect during both unstructured conversations and negotiations. Guerrero & Burgoon (1996) also found that the level of non-verbal involvement were positively correlated with the level of positive affect the participants displayed in conversations such as through smiling, facial and vocal pleasantness, and relaxed laughter. Although these non-verbal cues, such as smiling and facial pleasantness are, absent in IM conversations, various research by Walther, Herring, and other scholars (e.g., Herring, 2010 & 2012; Tidwell & Walther, 2002) found that people are still able to use verbal expressions such as smileys (e.g., ☺), capitalization (e.g., YAY), punctuation (e.g., What??????), ellipses (e.g., lol), or intentional alterations of words or grammar (e.g., yesssss) to express mood and feelings. Therefore, I hypothesize that:

H9: Participants who are lowly involved in the IM conversation with their partner will report higher level of negative emotions (such as frustration and annoyance) than those in the control condition.

The involvement of the speaker does not only affect that speaker's communication processes in the conversation, but also influence how their partners think and feel about the interaction. Edinger & Patterson (1983) reviewed studies about non-verbal involvement indications, such as gaze, touch, facial expression, body position, paralinguistic cues, and gestures. They concluded that these non-verbal behaviors played a significant role in exerting social control over the receivers, or listeners in a conversation, in various aspects such as persuasion (changing their attitudes and opinions), reinforcement (affecting their subsequent

performance or altering their roles in the interaction, especially in counseling or employment interviews), and impression management (changing their impressions about oneself to facilitate a more comfortable conversation). Burgoon & Newton (1991) conducted experiments, in which participants were asked to increase or decrease their level of conversational involvement however they saw fit in a conversation with a partner. These conversations were also videotaped and showed to a third person, an observer. They found that participants who interacted with highly involved partners rated these partners to be more composed, informal, and friendly. With similar experimental settings, Burgoon & Le Poire (1999) found that partners felt greater intimacy, and more dominated when conversing with participants who expressed greater non-verbal cues of conversational involvement including high vocalic and kinesic/proxemic involvement, high immediacy through body orientation, lean, and gaze, high vocal and kinesic expressivity (such as vocal intensity, variable pitch, vocal animation, and gestures), good conversational management in terms of fluency and coherence, and moderate relaxation in the form of relaxed bodies and voices. To compliment these results, Burgoon, Bonito, Bengtsson, Ramirez, Dunbar & Miczo (2000) found that highly involved partners were viewed as more credible, reliable, dependable, and attractive to work with. They also found them more receptive, and understanding. Guerrero & Burgoon (1996) found that participants responded to increased non-verbal involvement in their conversational partner by expressing more immediacy, warmth, and affection. They also became more fluent in their discussion with the highly involved partner. In response to their partners' decrease in involvement, participants became less affectionate, less interested, displayed less positive affects such as smiling or laughing, more vocal anxiety, less fluency and body coordination. In summary, these results suggested that people who expressed

greater involvement in interaction were better able to create and maintain social connection with their partners.

In face-to-face context, however, the results of the above studies are influenced by non-verbal cues, which are important for the expression of intimacy, and affection (Coker & Burgoon, 1987). It is still unclear how the speakers' level of involvement as expressed through verbal cues in text-based IM conversations will affect the experience of the partner. On the one hand, some scholars argued that without non-verbal cues, it is difficult for CMC conversants to develop significant affective experience (e.g., Short, William, & Christie, 1976). On the other hand, some studies (e.g., Walther et al., 2005; Walther, 1996) found that participants may be able to achieve comparable level of relational communication in CMC as in face-to-face interaction with only verbal cues. Therefore, I propose the following research question:

RQ2: How does the speaker's level of involvement affect his or her partner's emotions during the conversation, and understanding of the content of the conversation?

In summary, this chapter illustrates how involvement is expressed and interpreted using both verbal and non-verbal cues in face-to-face interaction. Based on these results, I propose several hypotheses regarding the verbal cues of involvement in text-based IM conversations. Moreover, I discuss the relationship between involvement and other communication processes, namely, the development of mutual understanding, and the emotional experiences of both the speaker and the partner in a conversation. I hypothesize that high level of involvement of the speaker will improve other communication processes for that speaker, and ask a research question about the effect of involvement on the partners' cognitive and affective outcomes. While in this chapter, I explain some universal principles regarding conversational involvement

in CMC, I will now turn to the discussion of the cultural variations in the perception and expression of involvement in CMC for participants from different parts of the world.

Interaction Involvement in Different Cultures

Culture differences in communication styles have been widely studied. People from the Western cultures are often said to be more individualistic, and thus emphasize the independence of individuals, whereas people from the Eastern cultures such as China or Japan are often described as collectivistic, emphasizing the interconnectedness of individuals in the context of social behavior and interactions (Triandis, 1995). Therefore, when giving arguments, resolving conflicts, or making requests, collectivistic people tend to avoid hurting other people's feeling, giving negative evaluations, or reducing imposition on other people, while individualistic individuals tend to emphasize effectiveness and efficiency in completing tasks (Kim et al., 1996; Oetzel et al., 2001). Moreover, Hall (1976) suggested that people from Western culture such as North America tend to adopt a direct, low-context style of communication, stating their opinions and thoughts explicitly and verbally, with little reliance on non-verbal cues such as facial expression. On the other hand, people from Eastern cultures such as China or Japan tend to adopt an indirect, high-context style, deriving meanings not only from the explicit, verbal content, but also from the communication context such as the relationship between speakers, and relying on the non-verbal cues such as facial expression or body language for the expression and interpretation of meaning. This observation about the culture difference in communication styles has been testified by various cross-culture communication studies (e.g. Gudykunst et al., 1996; Chua & Gudykunst, 1987; LaFrance & Mayo, 1978; Holtgraves & Yang, 1992; Ambady, Koo, Lee, & Rosenthal, 1996). Most of theses studies however were about face-to-face interactions.

In computer-mediated environments, multiple studies have also found cultural differences in the communication styles and strategies of participants from Western cultures such as North America, and Eastern cultures, such as China or Japan. Setlock, Quinones, & Fussell (2007) examined various features of language use in audio and video conferencing of American-American (AA) pairs, American-Chinese (AC) pairs, and Chinese-Chinese (CC) pairs. They found that pairs with at least one Chinese member used more "we" pronouns than AA pairs. Moreover, AA pairs used more "you" pronouns. These American pairs also used more words relating to thinking such as "understand" and "accept" than the other pairs. They also found that high-context CC pairs were more likely to make use of visual cues in video conferencing than the American, or cross-culture pairs. Stewart, Setlock, & Fussell (2004) examined the argumentation styles of AA, AC, and CC pairs in text-based IM conversations. They found that Chinese participants tended to use more reasoning activities (providing reasons for their claims) in their conversations than American participants. American participants tended to use more convergence markers (agreement, concession, acknowledgement) than Chinese participants. Furthermore, Chinese participants tended to use more disagreements than American participants. While these results may seem contradictory to the general individualism-collectivism distinction between Chinese and American participants, Stewart et al. suggested that they may indicate the Chinese participants' orientation toward inter-subjective argument goals through making clear where they disagreed and working through those disagreements.

While there have been many cross-culture studies about the different use of verbal cues in CMC conversations, these studies did not consider different levels, or states of involvement that participants had during their conversations. On the other hand, most studies about the expression and interpretation of verbal or non-verbal involvement cues were conducted on North American

participants. Norton (1983) and Cegala et al. (1982) suggested that the use of involvement cues in interactions might be different for speakers from different cultures. Results about the use of involvement cues in conversations from most previous studies may not apply well for Eastern participants such as those from China or Japan. Moreover, there are some evidence that Eastern participants and North American participants use verbal and non-verbal cues differently in conversations. For example, when using English in conversation, Chinese participants tend to use backchannel responses such as "yeah", "uh-huh" to indicate understanding or agreement, while native English speakers tend to use them as continuers, signaling the speakers to carry on (Tao & Thompson, 1991). McCarthy, Lee, Itakura, & Muir (2008) found cultural differences in the direction of gaze in a conversation between North American and East Asian participants. They found that Canadian looked up while they were thinking in a conversation with another person, while Japanese looked down. Consequently, I expect that there would be cultural differences in they way Chinese and American participants use verbal cues to express, or to interpret involvement in their text-based IM conversation. However, the paucity of research results about the interaction between culture and involvement in CMC prevents any explicit hypothesis. I ask the following research question:

RQ3: What are the differences in the way East Asian participants and North American participants use verbal cues to express involvement in a text-based IM conversation?

In order to test all the hypotheses and research questions regarding the verbal cues of involvement in cross-culture CMC conversations, I conducted two studies. The next two chapters present these studies in details.

CHAPTER 3

STUDY 1: INVOLVEMENT IN DYADIC SAME CULTURE, AND CROSS-CULTURE CMC CONVERSATIONS

This first study aims at analyzing the use of verbal involvement cues in text-based IM conversations between pairs of participants from a encoding perspective, in other words, how certain verbal cues are used when participants are highly or lowly involved in the conversation. As discussed in chapter 2, previous studies about the expression of involvement in face-to-face interactions (e.g., Cegala, 1989) suggested that the use of intensifiers (words expressing certainty), qualifiers (words expressing uncertainty), personal pronouns, definite articles, indefinite articles, and assent words changed systematically with the fluctuation in the level of involvement. Therefore, I hypothesize that:

H1: Speakers in the high-involvement condition will say more certainty words that those in the low-involvement condition in a text-based IM conversation.

H2: Speakers in the high-involvement condition will say fewer hedge words that those in the low-involvement condition in a text-based IM conversation.

H3: Speakers in the high-involvement condition will say fewer personal pronouns (I, me, etc…) that those in the low-involvement condition in a text-based IM conversation.

H4: Speakers in the high-involvement condition will say more relational pronouns (we, us, etc…) that those in the low-involvement condition in a text-based IM conversation.

H5: Speakers in the high-involvement condition will say more definite articles (the, this, that, etc…) that those in the low-involvement condition in a text-based IM conversation.

H6: Speakers in the high-involvement condition will say fewer indefinite articles (a, an, etc…) that those in the low-involvement condition in a text-based IM conversation.

H7: Speakers in the high-involvement condition will say more agreement words (yes, right, true, exactly, make senses, etc…) that those in the low-involvement condition in a text-based IM conversation.

Moreover, inherent in the definition of involvement is the focus of attention to the communication task, which may result in higher cognitive effort, and in turn, higher number of cognitive mechanism words. However, little research has been conducted to test how the use of cognitive mechanism words may be linked to involvement, especially in a text-based IM conversation. So I ask the following research question:

RQ1: *How does the speaker's level of involvement influence his or her use words expressing cognitive mechanisms, such as thinking, reasoning, causation, or speculation?*

The motivation for the study of the verbal involvement cues in text-based IM conversations is the important role of involvement in the success of team communication. Nowadays, with the advances in technologies, remote team collaboration is supported by computer-mediated tools, allowing team members to interact at a distance. In face-to-face interactions, multiple studies (e.g., Burgoon et al., 2000) suggested that the level of involvement directly influence the mutual understanding among speakers in a conversation, their emotional experiences, liking of each other, and comfort during the interaction. Does involvement have the same effects on other communication process outcomes in CMC as in face-to-face interactions? As discussed in chapter 2, based on the literature about involvement in face-to-face interactions, and the CMC literature about relational communication and social cues in CMC, I proposed the following hypotheses and research questions:

H8: In the IM conversation with their partners, lowly involved participants will report lower level of understanding of the partners' utterances than highly involved participants.

H9: In the IM conversation with their partners, lowly involved participants will report higher level of negative emotions (such as frustration and annoyance) than highly involved participants.

RQ2: How does the speaker's level of involvement affect his or her partner's emotions during the conversation, and understanding of the content of the conversation?

Lastly, as Norton (1983) and Parterson (1983) proposed, cultural norms regarding communication styles influence the use of verbal or non verbal cues to express involvement in conversations. Many studies (e.g. Gudykunst et al., 1996) have found cultural differences in the communication styles of participants from different geographical regions, especially those from North America and East Asia. However, few studies have examined how such cultural differences influence the way North American and East Asian use verbal cues of involvement in CMC. Since cooperation between American and Chinese teammates is becoming more popular nowadays, it is important to understanding how American and Chinese participants used textual cues differently to express involvement during team discussion. So I ask the following question:

RQ3: What are the differences in the way Chinese participants and American participants use verbal cues to express involvement in a text-based IM conversation?

To answers these hypotheses (H1 to H8) and research questions (RQ1 to RQ3), I conducted an experimental study. Pairs of American and Chinese participants were brought together to discuss a business proposal. The goal for the pairs was to mutually agree on, and submit a recommendation about a business idea to the experimenter. They discussed this task with each other only via text-based IM. During their conversations, I manipulated each participant's level of involvement using a distraction task, and at multiple times, asked them to rate their own, and their partner's level of involvement, understanding, and negative emotions.

Methods

The first study aims at exploring how people use certain verbal cues of involvement in a text-based IM conversation with a partner when their level of involvement fluctuates between normal and low. I conducted experiments with participants from North America (US and Canada) and from China, Taiwan, or Hong Kong. These participants were randomly paired up, and asked to discuss a business idea in 20 minutes using only text chat in Google Talk, a text-based IM clients by Google. During that 20-minute discussion, I manipulated each participant's level of involvement using a distraction task. Participants then answered questionnaires measuring their level of involvement, other communication process outcomes such as emotions or understanding, and other variables.

Participants. 60 students (41 undergraduate students, 47 females) studying at a large American university were recruited for course credits or for 10$ compensation. Of these, 30 students were native Chinese speakers who had been born in the People's Republic of China (25) or Taiwan (3) or Hong Kong (2), and had spent less than 5 years in the United States or Canada. The Chinese participants spoke fluent or near-fluent English. The other 30 American participants were all born and raised in the United States or Canada and spoke English as their native language. Twenty-eight American were Caucasian and two were Asian.

Each participant was paired randomly with a partner from the same culture or from a different culture, resulting in three combinations: 10 Chinese-Chinese (CC) pairs, 10 American-American (AA) pairs, and 10 American-Chinese (AC) pairs. Participants in a pair did not know each other prior to the experiment.

Materials. Pairs of participants discussed a business proposal for 20 minutes. Every 5 minutes, the experimenter asked them to pause, fill out a questionnaire, to play or not to play an

online computer game in the next 5 minute of their discussion.

Task. The discussion task involves a business proposal of a new on-campus outlet for a popular ice-cream brand. All of the participants in this study knew the ice-cream brand and the typical set-up of an ice-cream outlet of this brand. The owner of the ice-cream brand, in response to higher demand from the student population, would like to open a new shop on the university campus. 8 on-campus locations were under consideration. The participants needed to discuss with their partners to choose ONE among these 8 locations to open the new outlet. Each pair needed to consider each of the 8 locations carefully, listing at least 5 pros and 5 cons of the location, keeping in mind aspects such as: the personas of the customers who most frequent that location, costs of opening an outlet at that location, benefits and drawbacks to the student community as a whole when a new ice-cream outlet is opened at that location, etc. To keep the participants engaged in the discussion for the whole 20 minutes, the experimenter recommended that they discussed the pros and cons of 2 locations very 5 minutes in the order these locations were listed, and then choose the best location to recommend to the owner of the ice-cream brand. Moreover, participants in each pair were also asked to write one final report together after their 20-minute discussion, listing the pros and cons of each location based on their discussion, and their chosen location. This instruction, however, was only given to keep the participants engaged in the discussion. The participants actually didn't have to write the report at the end of the experiment.

Distraction task. To manipulate the level of involvement of participants during their conversation, I used a distraction task in the form of an online computer game. At some points during the 20-minute discussion, each participant in a pair had to play this game while he or she was chatting, with equal attention to the game and to the conversation. The game was thus

introduced to distract the participants from the conversation, resulting in lower level of involvement compared to the control condition where participants only focused on chatting. The game is a memory puzzle, in which players had to uncover 18 matching pairs of food items. All of these food items are common, universal items, such as an apple, an ice cream, or a bottle of wine. A maximum of two food items can be uncovered at a time. If the two items do not match, they will be covered. The player had to uncover two identical items at the same time, and had to successfully uncover all 18 pairs of food item within the time limit. The game is an online game and can be found at this web url: http://www.agame.com/game/tasty-food-memory.html. In this study, if participants have to play the game during their conversation with the partner, they have to play continuously, while discussing the task, for 5 minutes, no matter how many levels they can complete. If the game is over before the 5 minutes is over, the experimenter will ask the participant to restart and play the game again.

Communication processes survey. Every five minutes during their discussion, every participant in a pair was asked to pause everything he or she was doing and fill out a short survey. Since the discussion task is 20 minutes in total, each participant completed 4 such surveys in each experiment. The survey is hosted online at www.surveymonkey.com.

The survey consists of 14 7-point Likert scale questions. The first 6 questions were about participants' experience during the last 5 minutes of their conversation. The first 2 questions asked the participants about the level of frustration (1=not frustrated at all, 7=very frustrated), and annoyance (1=not annoyed at all, 7=very annoyed) participants felt during the last 5 minutes of conversation. The second 2 questions asked the participants how much they understood their partner, and how much their partner understood them during the last 5 minutes (1=not at all,

7=very well). The third 2 questions asked the participants how involved they were, and their partners were, in the last 5 minutes (1=not involved at all, 7=very involved).

The next 4 questions were adapted from Cegala (1981) Interaction Involvement Scale to measure the participants' level of involvement during the last 5-minute conversation (see Appendix). These 4 questions were chosen based on the result of a pilot test, showing high reliability.

The last 4 questions asked about the participants' perception of their partner during the last 5 minutes. Participants indicated how much they liked their partner, felt liked by their partner, enjoyed talking to their partner, and how comfortable they were collaborating with the partner. All the questions used in this survey are displayed in the Appendix.

Post task survey. After the 20-minute discussion and 4 communication process surveys, participant also completed a post-task survey. This survey is also hosted online at www.surveymonkey.com. The post-task survey asked about their reactions to the task, their cultural values, their communication styles, and their basic demographic information. Task-related questions consisted of four 7-point scales adapted from the NASA TLX workload scale to measure mental effort, temporal effort, overall effort, and frustration during the task, and two 7-point scales to measure participants' subjective evaluation of their team and individual performance on the task.

We also included questions about cultural values from Triandis' (1995) individualism and collectivism scale. Questions about communicative styles include a subset of 13 items from Gudykunst et al.'s (1996) high and low context culture scale, selected from the three factors that have the highest loadings in their study: ability to infer meaning, interpersonal sensitivity and use of indirect communication.

Equipments. Both participants in every pair used identical Mac Book Pro laptops, running Mac OS X Lion, with pre-installed "Messages" software, an Instant Messaging client that can be configured for Google Talk chat servers. Participants chatted with their partners using the "Messages" program, and played the computer game on Safari web browsers. A computer program written in Apple Script was used to control the flow of the experiment. This computer program would pop-up messages asking the participants to pause the discussion and the game, bring the communication process survey to the front, and prompted the participants to fill out this survey every 5 minutes during the 20-minute discussion. At the end of the discussion, the computer program would prompt participants to fill out the post-task questionnaire. This computer program also recorded the participants' chat windows in the background during the participants' conversation. These recordings will be used for the second study.

Procedures. Two participants, who are strangers to each other, were invited to the lab, and asked to sit down at two workstations, separated by a large divider. The experimenter then introduced the study to the participants, and briefed them on how to use the chat program, how to play the game, and explained the discussion task. The participants were then asked to read more detailed instructions on the computer. Both participants also practiced playing the game until they understood the game before they began discussion. When both participants had read the instructions, understood everything, the discussion began. At the beginning of the discussion, and every five minute during the 20 minutes discussion, the experimenter would randomly ask each of the participant in the pair to either play (low involvement, or L condition), or not to play (control, or C condition) the computer game while they were chatting, with equal attention to the game and the discussion. To give the participants an incentive to pay attention to both the game and the discussion equally, the experimenter told the participants that apart from the $8 basic

compensation they would get for the experiment, they had a chance to earn a maximum of $2 bonus. Their scores on the game, and the quality of their discussion would determine how much of a bonus they would get. The experimenter randomized the order of the L and the C conditions; so that for four segments (each segment lasting 5 minutes) of the 20-minute discussion, there would be one segment in which both participants in a pair were in the L condition (playing the game while chatting), one segment in which both of them were in the C condition (not playing the game), and two segments in which one of them were in the L condition, and the other in the C condition. After every five-minute segment during the twenty-minute discussion, both participants stopped all their activities (including chatting and playing) to answer the communication process survey, and to receive instructions from the experimenter (about whether to play the game) for the next 5-minute segment. In all these four segments, the participants discussed the pros and cons of 8 locations to open a new outlet of Cornell Dairy Bar, and chose the best location. The experimenter suggested that they discussed 2 locations during each segment, but the participants may opt to lead their discussion their own way, as long as they finished the task given. After four segments, participants were asked to fill out the post-task survey. Then they were debriefed, thanked, and rewarded. The experimenter explained during debriefing that all participants would be given $10 regardless of their performance.

Measures. I collected three types of measurements from the experiments. First, from the communication process survey participants filled out every 5 minutes, I collected measurements about their experience during the conversation. Second, from the logs of IM chat sessions, I counted the number of different linguistic cues such as definite articles that each participant used during their conversations, using a coding scheme, and TAWC, an adaptation of Pennebaker & Francis (1999)'s (LIWC) software developed by Kramer, Fussell, & Setlock (2004). These first

two sets of measurements will be used a dependent variables in later hypothesis tests. Third, from the post-task survey, I collected measurements of the participants' cultural values and styles. These measurements are not dependent variables, but are used to establish that Chinese and American participants differed in terms of cultural background and communication style: individualism, collectivism, and high context communication.

Dependent variables: Experience during conversation. After every 5-minute segment of their conversation participants answers 14 rating questions asking about their thoughts and feelings, on a 7-point Likert scale. These questions made up 5 measurements: level of involvement, understanding, frustration, annoyance, and general experience of the conversation.

Involvement. I chose 8 items from Cegala's Interaction Involvement Scale (Cegala, 1981) based on their factor loadings and conducted a pretest with undergraduate students to determine a measurement for involvement during conversations. This pretest showed that 4 items together made up a reliable measure. Therefore, I used these 4 items, with some adaptation to suit the context of this study (see Appendix). Test of reliability of these 4 items produced good Cronbach's α value of .78. Ratings for these 4 items were then averaged.

I also asked participants to answer a single question about how involved or committed they were (self's involvement), and their partner was (partner's involvement) in the conversation (1=not at all involved, 7=very much involved). Since the ratings were negatively skewed, and log transformation did not improve the normality of the distribution, I created a recoding scheme based on the histogram of the ratings on a 7-point scale. I recoded the data into three categories (1 to 3 =1, 4 to 6=2, and 7=3), roughly corresponding to low involvement, average involvement, and high involvement.

Understanding. Participants' ratings, on a 7-point scale (1=not understood at all, 7=very

well understood), of how much they understood their partner (self's understanding) during the 5-minute segment of their conversation were negatively skewed; and log transformation did not improve the normality of the distribution. I recoded the data into three categories (1 to 4 =1, 5 to 6=2, and 7=3), roughly corresponding to problematic understanding, good understanding and excellent understanding. In the exact same manner, I also recoded participants' ratings on a 7-point scale of how much they thought their partner understood them (partner's understanding), which were negatively skewed.

Frustration. Participants' ratings, on a 7-point scale (1=not frustrated at all, 7=extremely frustrated), of how frustrated they were during the 5-minute segment of the conversation were positively skewed, so I recoded the data into three categories (1 =1, 2 to 3=2, and 4 to 7=3), roughly corresponding to low frustation, average frustration, and high frustration.

Annoyance. Participants' ratings, on a 7-point scale (1=not annoyed at all, 7=extremely annoyed), of how annoyed by their partner they were during the 5-minute segment of the conversation were positively skewed, so I recoded the data into three categories (1 =1, 2 to 3=2, and 4 to 7=3), roughly corresponding to low, average, and high annoyance.

General experience. 4 questions were taken from Wang, Fussell, & Setlock (2009) study about team interaction to make up the measurement for the general experience participants felt about the collaboration with their partners (Cronbach's α=.879). These include questions about the relationship between the two partners, and their comfort and enjoyment of the discussion (see Appendix). Ratings for these 4 items were averaged to compute the general experience score.

Dependent variables: Counts of verbal cues. I counted the number of verbal cues of involvement in the transcript of the participants' IM chat session. Theses verbal cues can be of two types: 1) words counts of certain categories, such as the count of articles, or pronouns, and

2) the number of idea units expressing different aspects of involvement such as agreement. The word counts are computed using TAWC, a computer program by Kramer et al. (2004). The numbers of idea units of different categories are computed using a coding scheme. Except for the counts of relational (we) pronouns, the raw word counts are negatively skewed, and thus the logs of the raw count are used in subsequent analyses.

Counts of intensifiers. Intensifiers are words used to express the speaker's confidence, certainty and assurance about his or her idea. These include words to emphasize one's position or idea, or highlight the importance of one's statement, such as "definitely", "absolutely", or "sure" (see Appendix for the complete list of the intensifiers I counted). This list was created based on the dictionary by Pennebaker & Francis (1999), the list of intensifiers in Cegala (1989), and consideration of the word corpus from the data.

Counts of qualifiers. In opposite to intensifiers, qualifiers are used to express hedges, uncertainty, or reservations about an idea. Common qualifiers include "possibly", "may be", "might", or "perhaps" (see Appendix for the complete list of the qualifiers I considered). Similar to the list of intensifiers, this list was created based on Pennebaker & Francis' (1999) dictionary, the list of qualifiers in Cegala (1989), and consideration of the word corpus from the data.

Counts of personal pronouns. Personal pronouns are those that refer to the individual self, such as I, me, or mine (see Appendix for the complete list of the personal pronouns I counted). This list was generated based on the dictionary by Pennebaker & Francis (1999), taking into account the corpus generated from my data, to include possible misspelled words or abbreviations with the same meaning that participants typed in their conversation.

Counts of relational pronouns. Relation pronouns are those that refer to the individual and his or her partner as a whole, such as we, us, or our (see Appendix for the complete list of

the relational pronouns I counted). Similar to the list of personal pronouns, this list was created based on the dictionary by Pennebaker & Francis (1999), and consideration of the word corpus from the data.

Counts of definite and indefinite articles. The lists of definite articles such as "the", "this", "that", and indefinite articles such as "a", "an" were generated based on the dictionary created by Pennebaker & Francis (1999), and also taking into account the corpus from my data.

Count of assent words. I counted the numbers of words expressing consent to an idea stated before it (see Appendix for the complete list of the assent words I counted). This list was created based on the dictionary by Pennebaker & Francis (1999).

Count of cognitive mechanism words. I also counted the number of words expressing thinking, reasoning, contemplating, speculation, or reflection (see Appendix for the complete list of words I counted under this category). This list was created based on the dictionary by Pennebaker & Francis (1999).

Results

I report the results from Study 1 in three parts: 1) the expression of involvement cues in IM conversations, 2) the interaction of involvement and other communication processes, and 3) culture differences in the use of verbal cues for involvement. To explore how participants use verbal cues to indicate involvement, I counted the number of words and idea units in different categories that are influenced by the changes in the level of involvement of the speakers. Therefore, the first part of results includes analyses on these word counts for different conditions of the experiment (see Appendix for the correlations among these word counts). To examine the interaction of involvement and understanding, negative emotions, liking of partner and enjoyment of collaboration, I measured participants' level of understanding, frustration,

annoyance, and other experience on 7-point Likert scales every 5 minutes of their conversation. The second part of results includes analyses on these measurements (see Appendix for the correlations between these communication process outcomes). Lastly, to explore culture differences in the use of verbal cues for involvement, I included the culture of the speaker, the culture of the partner, the interaction between these two factors, and the interaction between the involvement manipulation and the culture of the speaker as the independent variables in the analyses on the word counts of different categories. The third part of the results describes these analyses in details.

Manipulation check. To make sure that the distraction task indeed lowered the participants' level of involvement, I conducted a mixed model ANOVA on the level of involvement as measured by 4 items adapted from Cegala's (1981) Interaction Involvement Scale, with condition (low involvement with distraction task, and high involvement without distraction) applied to the speaker, condition applied to the partner, and culture as the fixed effects, and pairs, participants, and time as random effect (R^2=.79). I controlled for the involvement of the partner in these analyses since involvement is an interactive process, in which the two speakers mutually influence each other (Patterson, 1983). The result (Figure 1) indicates that my manipulation worked. Participants reported being significantly less involved in the conversation with their partner in the low-involvement condition (when they had to do the distraction task) (M=5.61, SE=.11) than in the high-involvement condition (M=3.46, SE=.11) (F[1, 145.30]=456.51, p<.0001). There was no significant effect of culture, or the partner's involvement on the speaker's reported level of involvement.

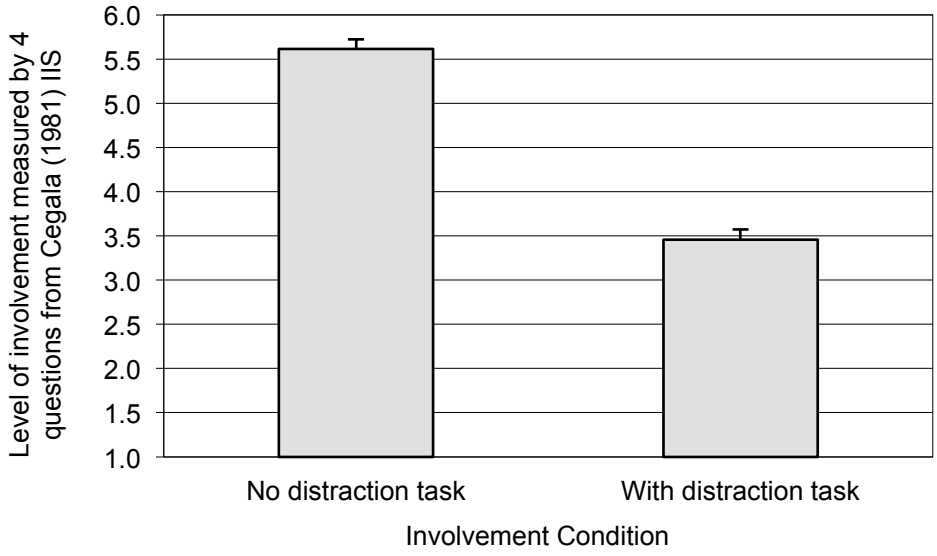

Figure 1: Level of involvement reported by participants in two conditions

I also collected a single-item measurement of involvement (by asking participants to report how involved they were in the conversation on a scale from 1 to 7). Using s similar mixed model ANOVA on this single-item measurement, I found a similar result. Participants reported higher involvement when they didn't have to do the distraction task (M=6.32, SE=.14) than when they had to (M=3.63, SE=.14) ($F[1,177]=359.18$, $p<.0001$), with no significant effect of partner's involvement or culture. Since correlation between the single item measurement and the involvement measure from the IIS is significant ($p<.001$) and high (.79), and since the measurement based on the IIS has already been tested for internal validity in previous studies, I will only report the results regarding the involvement measurement by the IIS from now on.

Participants' ratings of partner's involvement and understanding. I also asked participants to rate their partner's level of involvement and understanding (of what the participants said) every 5 minutes (1=lowest to 3 = highest, after recoding to adjust for normality). I then conducted mixed model ANOVA of the same form on the speaker's ratings of their partner's involvement ($R^2=.63$) and understanding ($R^2=.62$). I found that indeed, speakers

rated their partners significantly (F[1, 114.6]=35.60, p<.0001) higher in involvement when the partner was in the high involvement condition (when the partner did not have to do the distraction task) (M=2.29, SE=.06) than when the partner was in the low involvement condition (when the partner had to do the distraction task) (M=1.83, SE=.06) (see Figure 2). Moreover, speakers rated their partners significantly (F[1, 160.40]=6.76, p=.01) higher in the level of understanding when the partner was in the high involvement condition (when the partner did not have to do the distraction task) (M=2.25, SE=.09) than in the low involvement condition (when the partner had to do the distraction task) (M=2.03, SE=.09) (see Figure 3).

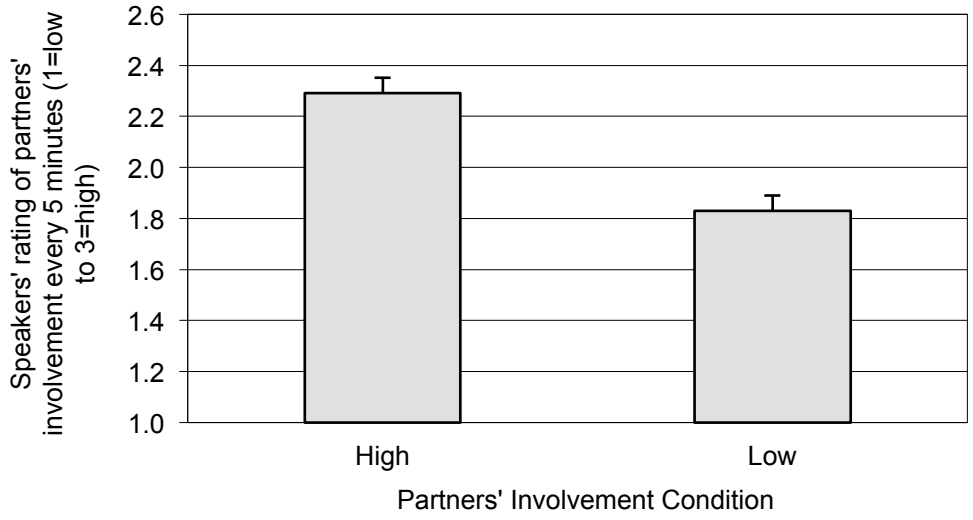

Figure 2: Participants' rating of their partners' level of involvement two conditions

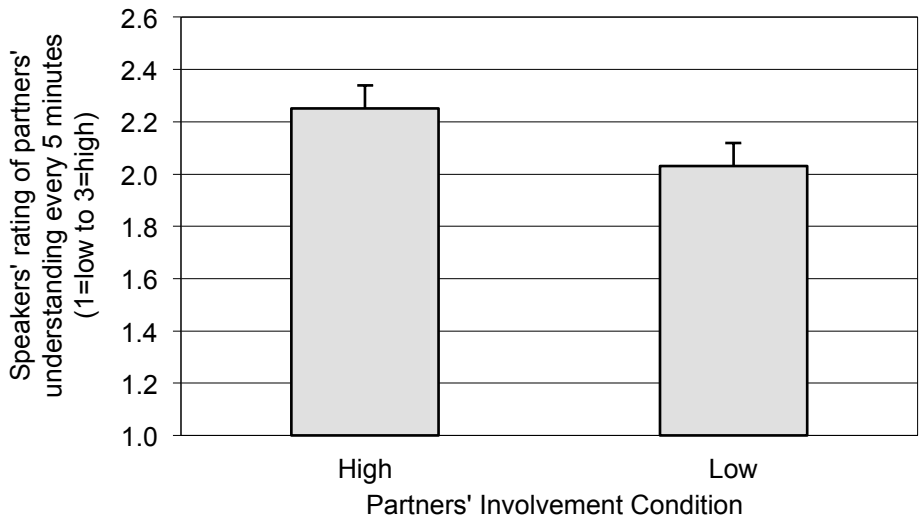

Figure 3: Participants' rating of their partners' level of understanding two conditions

Word count. I analyze the total number of words said by participants in the two involvement conditions. Since involvement indicates the level of concentration on the discussion, I expect that people in the high involvement condition spoke more words than in the low involvement condition. I conducted a mixed model ANOVA, with speakers' (participants') involvement condition, partners' involvement condition, and culture as the fixed effects, and pair, participants, and time as the random effect on the total number of words said every 1 minute (R^2=.62). I found that participants spoke significantly (F[1,142.50]=80.77, p<.0001) more words when they were highly involved (M=23.42, SE=.89) than when they were lowly involved (M=16.18, SE=.89) (see Figure 4).

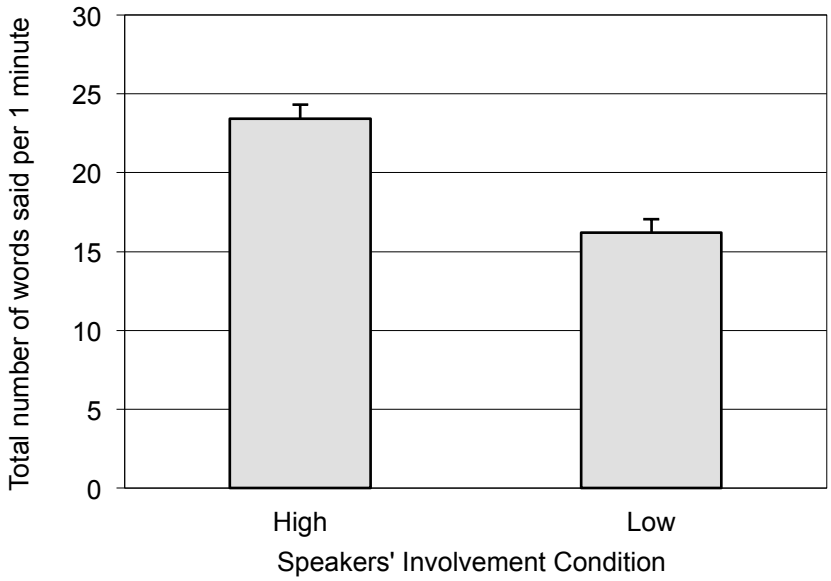

Figure 4: Total number of words said every 1 minute in two conditions

Verbal expression of involvement. H1 to H7, and RQ1 are about the difference in the count of words from different categories in the low-involvement and the high involvement conditions. To test these hypotheses and answer this research question, I conducted mixed model ANOVAs with the experimental condition as the main fixed effect. I controlled for the partner's involvement condition, the interaction between participants' involvement and partners' involvement, the culture combination of the pair (participants' culture, partner's culture, and the interaction of the two), and the total number of words said. Not surprisingly, in all these analyses, the effect of the total number of words was always significant (all p-values < .001), and in the same direction: that participants in the high involvement condition used more words in total than in the low involvement condition. I also included the random effect of participant, pair, and time. I control for the interaction between the participants' and his or her partner's involvement condition since interaction involvement is an interactive process (Patterson, 1983), and since the verbal styles and behaviors of the two speakers in a conversation are mutual

adaptive. I report the results below in the order of the hypotheses and research question. Figure 5 displays the results for all 7 word categories considered. In Table 1, I listed the means and standard errors on the log scale, and the actually number of words participants said in the high and low involvement conditions for different word categories.

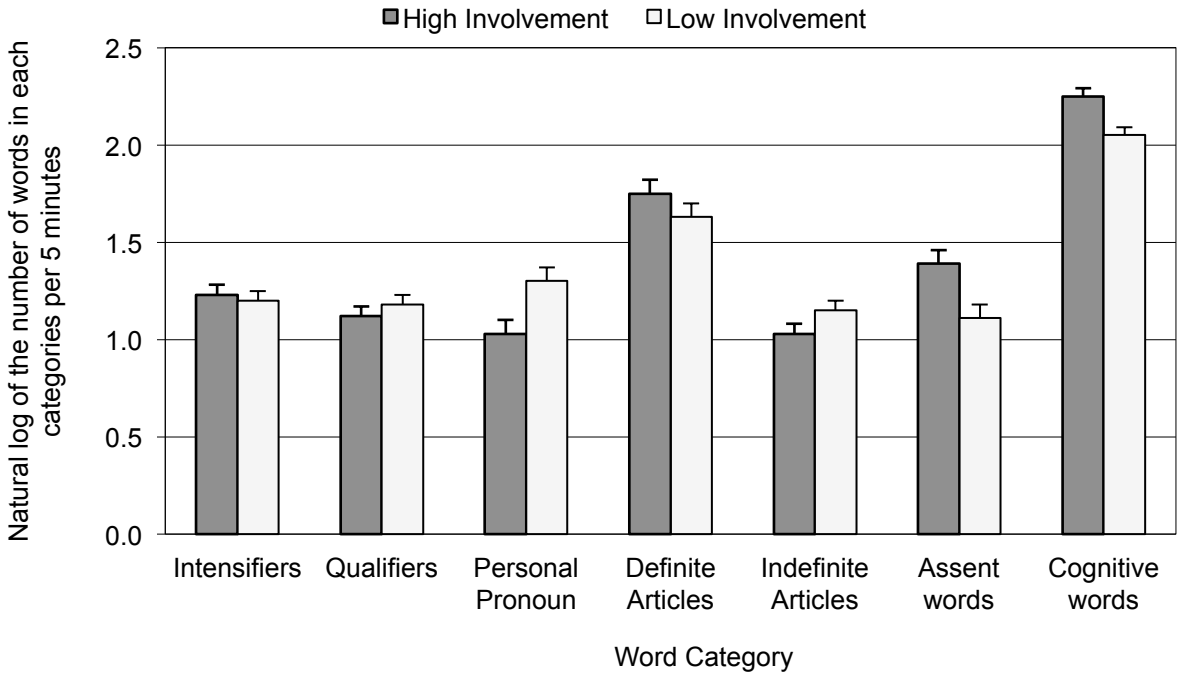

Figure 5: Mean natural log of the number of words in 7 different categories, said per 5 mins in two involvement conditions

Intensifiers. H1 proposed that the participants said more words expressing certainty, or intensifiers, when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of intensifiers said by each participants every 5 minutes, as the raw word counts is negatively skewed (R^2=.51). I did not find any significant difference in the number of intensifiers participants said in the high involvement condition versus in the low involvement condition (F[1, 119.80]=.18, n.s). H1 was not supported.

Qualifiers. H2 proposed that the participants said fewer words expressing uncertainty, or qualifiers, when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of qualifiers said by each participants every 5 minutes, as the raw word counts is negatively skewed (R^2=.55). I did not find any significant difference in the number of qualifiers participants said in the high involvement condition versus in the low involvement condition (F[1, 108.60]=1.32, p=.25). H2 was not supported.

Table 1: Means, standard errors on log scale, mean numbers of words of different categories said by participants in the high, and low involvement conditions

Word category	**Involvement condition**		**p val**
	High	**Low**	
Intensifiers	M=1.23, (SE=.05), 2.42 words	M=1.20, (SE=.05), 2.32 words	
Qualifiers	M=1.12, (SE=.05), 2.06 words	M=1.18, (SE=.05), 2.25 words	
Personal pronouns	M=1.03, (SE=.07), 1.80 words	M=1.30, (SE=.07), 2.66 words	***
Definite articles	M=1.75, (SE=.07), 4.75 words	M=1.63, (SE=.07), 4.10 words	*
Indefinite articles	M=1.03, (SE=.05), 1.80 words	M=1.15, (SE=.05), 2.15 words	
Assent words	M=1.39, (SE=.07), 3.01 words	M=1.11, (SE=.07), 2.03 words	***
Cognitive mech. words	M=2.25, (SE=.04), 8.48 words	M=2.05, (SE=.04), 6.76 words	**

Notes: p values of significance are for the difference between the two conditions. 2-tailed p values: + p<=.08, * p<= .05, ** p<=.01, *** p<=.001

Personal pronouns. H3 proposed that the participants said fewer personal pronouns when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of personal pronouns said by each participants every 5 minutes, as the raw word counts is

negatively skewed (R^2=.61). The results support H3 (see Figure 5). Participants said significantly fewer personal pronouns in the high involvement condition (M=1.03 on log scale, or 1.8 words, SE=.07 on log scale) than in the low involvement condition (M=1.30 on log scale, or 2.66 words, SE=.07 on log scale) (F[1, 46.04]=18.85, p<.001) (see Table 1).

Relational Pronouns. H4 proposed that the participants said more relational pronouns when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of relational pronouns said by each participants every 5 minutes, as the raw word counts is negatively skewed (R^2=.51). I did not find any significant difference in the number of qualifiers participants said in the high involvement condition versus in the low involvement condition (F[1, 45.60]<1, n.s). H4 was not supported.

Definite articles. H5 proposed that the participants said more definite articles when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of definite articles said by each participants every 5 minutes, as the raw word counts is negatively skewed (R^2=.73). The results support H5 (see Figure 5), with a near significant effect of involvement condition on the log of the number of definite articles said every 5 minutes (F[1, 71.18]=3.82, p=.05). Participants said more definite articles in the high involvement condition (M=1.75 on log scale, or 4.75 words, SE=.07 on log scale) than in the low involvement condition (M=1.63 on log scale, or 4.10 words, SE=.07 on log scale) (see Table 1).

Indefinite articles. H6 proposed that the participants said fewer indefinite articles when they were highly involved, than when they were lowly involved. To test this hypothesis, I conducted a mixed model ANOVA of the form outlined above on the log of the total number of

indefinite articles said by each participants every 5 minutes, as the raw word counts is negatively skewed (R^2=.42). The results did not support H6 (F[1, 116.40]=2.81, p=.09).

Assent words. H7 proposed that the participants said more agreement messages when they were highly involved, than when they were lowly involved. Assent words are those that can be used to express agreement such as "true", "ok", "yes", "agree". I conducted a mixed model ANOVA of the form outlined above on the log of the total number of assent words said by each participants (R^2=.51). I found a significant effect of involvement condition (F[1, 130.20]=15.39, p<.001) (see Figure 5). Participants said more assent words when they were highly involved (M=1.39 on the log scale, or 3.01 words, SE= .07) than when they were lowly involved (M=1.11 on the log scale, or 2.03 words, SE=.07) (see Table 1). The results support H7.

Cognitive mechanism words. RQ1 asked how the level of involvement may affect the use of words expressing cognitive thinking. I conducted a mixed model ANOVA of the form above on the log of the total number of cognitive mechanism words based on Pennebaker & Francis (1999) (R^2=71). I found a significant effect of involvement condition (F[1, 56.53]=7.11, p=.01). Participants said more cognitive mechanism words when then were highly involved (M=2.25 on the log scale, or 8.48 words, SE=.04) than when they were lowly involved (M=2.05 on the log scale, or 6.76 words, SE=.04) (see Figure 5, and Table 1).

Effect of involvement on other communication processes. H7 and H8 described the relationship between a speaker's level of involvement in the conversation, and his or her own level of understanding and negative emotions, such as tension and frustration. RQ2 asked how the speakers' involvement influences the partners' communication process outcomes such as the level of understanding or emotions. Note that in the experiments, both participants in a pair assumed equal roles, so both of them are speakers, and both are partners of the other participant.

Therefore, to test these two hypotheses, as well as RQ2, I conducted mixed model ANOVA, with involvement condition applied to the speaker, the involvement condition applied to the partner, and culture as the fixed effects, and pair, participant, and time as the random effects. I report the results below, in this order: first, the effects of the speakers' involvement condition on their own understanding, frustration, annoyance, and general experience during the conversation, and second, the effects of the partners' involvement condition on the participants' self reported level of understanding, frustration, annoyance, and general experience, as the answer to RQ2.

Since the distributions of the levels of understanding, frustration, and annoyance on a 7-point scale were skewed, and log-transformation did not improve their normality, I recoded these measurements into a 3-point scale. Due to this recoding, I also conducted a mixed-model multinomial logistic regression on the recoded level of understanding, frustration, and annoyance as ordinal variables instead of continuous variables. The results of these analyses were similar to those of the mixed model ANOVAs proposed above. Therefore, for ease of interpretation, I report only the results from the mixed model ANOVAs here*.

Effect of speakers' involvement on speakers' own communication processes. Figure 6 displays the means for all of the speakers' communication process outcome variables in different involvement conditions applied to them. In Table 2, I listed the means and standard errors of all these variables in the high involvement and low involvement conditions.

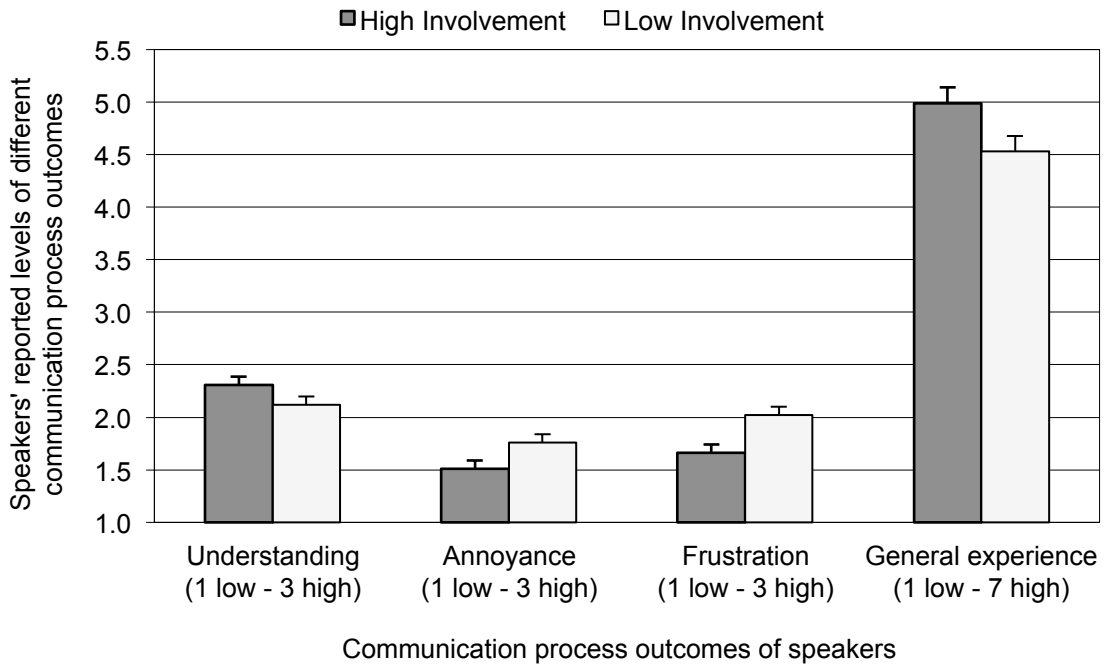

Figure 6: Speakers' self reported level of understanding, annoyance, and frustration (all on a 1 - 3 scale), and general experience (on a 1 - 7 scale) every 5 minutes

Table 2: Means, and standard errors of the speakers' level of understanding, annoyance, and frustration (all on a 1 – 3 scale), and general experience (on a 1 - 7 scale) in the high, and low involvement conditions

Speakers' communication process outcomes	**Involvement condition**		**p val**
	High	**Low**	
Understanding	M=2.31, (SE=.08)	M=2.12, (SE=.08)	**
Annoyance	M=1.56, (SE=.08)	M=1.76, (SE=.08)	***
Frustration	M=1.66, (SE=.08)	M=2.02, (SE=.08)	***
General experience	M=4.99, (SE=.15)	M=4.53, (SE=.15)	***

Notes: p-values of significant are for the difference between conditions. 2-tailed p values: + p<=.08, * p<= .05, ** p<=.01, *** p<=.001

Effect on speaker's understanding. H8 proposed that speakers would report a higher level

of understanding of what their partner said when they were highly involve than when they were lowly involved. Every 5 minutes during the conversation, I asked participants to report how much they understood their partner. I conducted a mixed model ANOVA of the form outlined above (R^2=.54) on the speaker's reported level of understanding (1=low to 3=high). I found a significant effect of the speakers' involvement condition on their own level of understanding (F[1.159.60]=5.87, p=.01). Speakers reported higher level of understanding of their partner when they are highly involved (M=2.31, SE=.08) than when they are lowly involved (M=2.12, SE=.08) (see Figure 6 and Table 2). H8 is supported.

Effect on speaker's annoyance. H9 proposed that speakers would report lower level of annoyance with their partner when they were highly involved than when they were lowly involved. Participants reported their level of annoyance every 5 minutes during their conversation. I conducted a mixed model ANOVA of the form outlined above (R^2=.56) on the speakers' reported level of annoyance (1=low to 3=high). I found that in support of H9, speakers reported significantly lower annoyance (F[1,48.82]=13.64, p< .001) when they were highly involved (M=1.51, SE=.08) than when they were lowly involved (M=1.76, SE=.08) (Figure 6 and Table 2).

Effect on speaker's frustration. H9 proposed that speakers would report lower level of frustration when they were highly involved than when they were lowly involved. Participants reported their level of frustration every 5 minutes during their conversation. I conducted a mixed model ANOVA of the form outlined above (R^2=.55) on the speakers' reported level of frustration (1=low to 3=high). I found that in support of H9, speakers reported being significantly less frustrated (F[1, 83.04]=22.49, p< .0001) when they were highly involved (M=1.66, SE=.08) than lowly involved (M=2.02, SE=.08) (see Figure 6 and Table 2).

Effect on speaker's general experience. Highly involved speakers are expected to enjoy the conversation, and like their partner more than lowly involved speakers. I conducted a mixed model ANOVA of the form outlined above (R^2=.68) on the speakers' general experience of the conversation (1=lowest to 7=highest). I found that indeed, highly involved participants significantly (F[1,177.4]=25.23, p<.0001) reported higher level of satisfaction when they were highly involved (M=4.99, SE=.15) than when they were lowly involved (M=4.53, SE=.15) (see Figure 6 and Table 2).

Effect of speaker's involvement on partner's communication processes. Figure 7 displays the results for all of the partners' communication process outcome variables in different involvement conditions applied to the speakers. In Table 3, I listed the means and standard errors of all these variables in the high involvement and low involvement conditions.

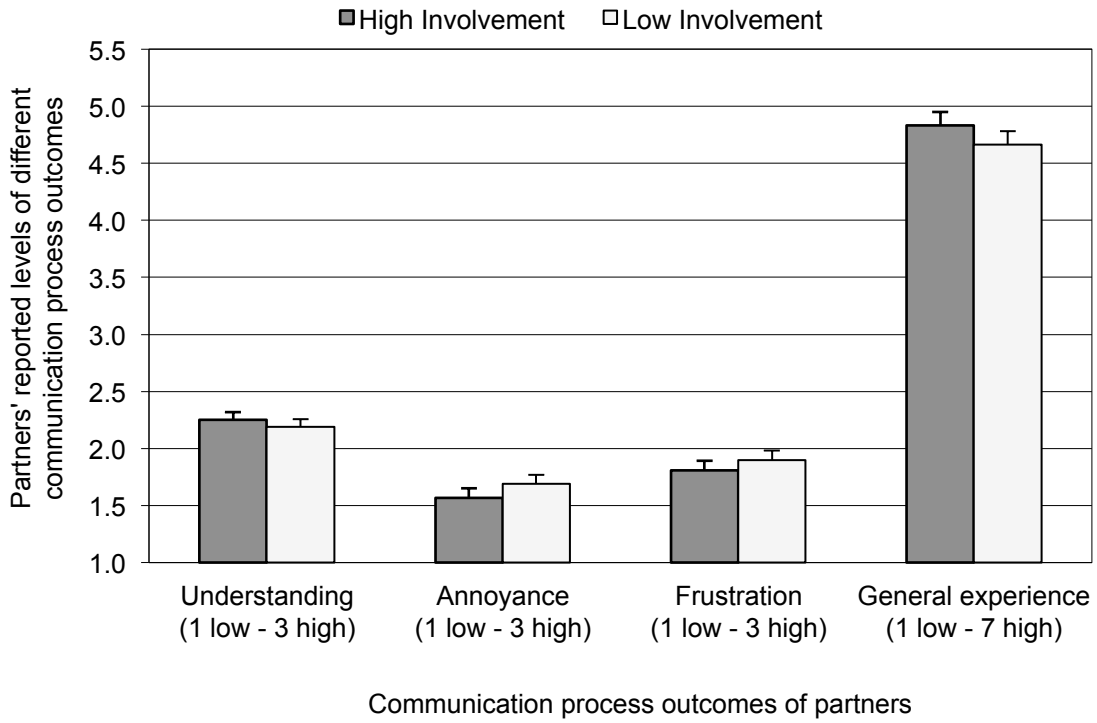

Figure 7: Partners' self reported level of understanding, annoyance, and frustration (all on a 1 - 3 scale), and general experience (on a 1 - 7 scale) every 5 minutes

Effect on partner's understanding. I conducted a mixed model ANOVA of the form outlined above (R^2=.54) on the partner's reported level of understanding (1=low to 3=high). I did not find any significant effect of the speakers' involvement condition on their partner's understanding (F[1.159.60]=.53, n.s).

Effect on partner's negative emotions. I conducted a mixed model ANOVA of the form outlined above on the partners' reported level of annoyance (1=low to 3=high) (R^2=.56), and level of frustration (1=low to 3=high) (R^2=.55). I did not find any significant effect of the speaker's involvement on the partner's annoyance (F[1,48.82]=1.67, p=.20), or partner's frustration (F[1, 83.04]=1.84, p=.18).

Effect on partner's general experience. I conducted a mixed model ANOVA of the form outlined above (R^2=.68) on the partners' general experience of the conversation (1=lowest to 7=highest). I found that indeed, the partners of highly involved speakers significantly (F[1,177.4]=5.51, p=.02) reported higher level of satisfaction (M=4.87, SE=.15) than those with lowly involved speakers (M=4.65, SE=.15) (see Figure 7 and Table 3).

Table 3: Means, and standard errors of partners' level of understanding, annoyance, and frustration (on 1 - 3 scale), and general experience (on 1 - 7 scale) in different conditions

Partners' communication process outcomes	**Involvement condition**		**p val**
	High	**Low**	
Understanding	M=2.25, (SE=.07)	M=2.19, (SE=.07)	
Annoyance	M=1.57, (SE=.08)	M=1.69, (SE=.08)	
Frustration	M=1.81, (SE=.08)	M=1.90, (SE=.08)	
General experience	M=4.83, (SE=.12)	M=4.66, (SE=.12)	*

Notes: p-values of significance are for the difference between conditions. 2-tailed p values: + p<=.08, * p<= .05, ** p<=.01, *** p<=.001

Cultural differences in the use of verbal cues to express involvement. RQ3 asked whether there is any cultural difference in the way Chinese participants and American participants used verbal cues when they are highly, and lowly involved. To answer this research question, I conducted a mixed model ANOVA with speakers' involvement condition, partner's involvement condition, speaker's culture, partner's culture, speaker's x partner's culture, and the full interaction effects among speaker's culture, partner's culture, and speaker's involvement condition as the fixed factors controlling for the total number of words said. The random effects include pair, participant nested in pair, and time order nested in participant.

First, I found that American participants said significantly ($F[1, 60.31]=8.25$, $p<.01$) more indefinite articles in general ($M=1.19$, $SE=.06$ on the log scale, or 2.29 words) than Chinese participants ($M=.98$, $SE=.06$ on the log scale, or 1.66 words). Moreover, they also said significantly ($F[1, 56.05]=7.39$, $p<.01$) fewer assent words ($M=1.13$, $SE = .06$ on the log scale, or 2.09 words) than Chinese participants ($M=1.38$, $SE=.06$ on the log scale, or 2.97 words).

Second, I found interesting interaction effects for the number of definite articles and cognitive mechanism words said by American and Chinese participants in different involvement conditions. In table 4, I listed the means, and standard errors on the log scale, and the mean total number of definite articles and cognitive mechanism words said by American and Chinese participants under the high involvement, and low involvement conditions.

I found a significant interaction effect between the speaker's involvement condition and the speaker's culture on the number of definite articles said ($F[1, 175.90]=5.27$, $p=.02$). This means that the frequency of definite articles used by the American participants under different involvement conditions differ from that of the Chinese participants under different involvement conditions. Tukey HSD tests showed that the American participants used significantly more

definite articles when they are highly involved (M=1.94, SE=.09 on the log scale, or 5.96 words) than when they are lowly involved (M=1.63, SE=.09 on the log scale, or 5.10 words) (see Table 4). For the Chinese participants however, there is no significant difference between the number of definitely articles used when they are highly involved (M=1.61, SE=.09 on the log scale, or 4.00 words) and when they are lowly involved (M=1.57, SE=.09 on the log scale, or 3.80 words) (see Table 4). These results are illustrated in Figure 8.

Table 4: Total number of definite articles and cognitive mechanism words said by American and Chinese participants in two involvement conditions

Word category	**Participants' culture**	
	American	**Chinese**
Definite Articles	High Involvement Condition M=1.94, (SE=.09), 5.96 words	High Involvement Condition M=1.61, (SE=.09), 4.00 words
	Low Involvement Condition M=1.63, (SE=.09), 5.10 words	Low Involvement Condition M=1.57, (SE=.09), 3.80 words
Cognitive mechanism words	High Involvement Condition M=2.20, (SE=.07), 8.03 words	High Involvement Condition M=2.34, (SE=.07), 9.39 words
	Low Involvement Condition M=2.14, (SE=.07), 7.49 words	Low Involvement Condition M=1.93, (SE=.07), 5.88 words

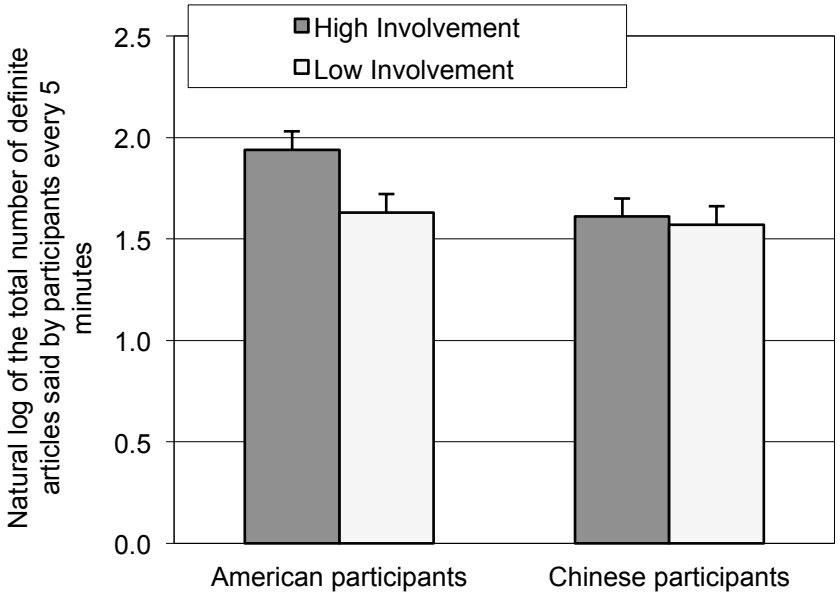

Figure 8: Natural logs of the numbers of definite articles said by American and Chinese participants every 5 minutes in the high, and the low involvement conditions

I also found a significant interaction effect between the speaker's involvement condition and the speaker's culture on the number of cognitive mechanism words said ($F[1, 176.9]=5.54$, $p=.02$). This means that the frequency of cognitive mechanism words used by the American participants under different involvement conditions differ from that of the Chinese participants under different involvement conditions. Tukey HSD tests showed that for the American participants, there is no significant difference between the number of cognitive words used when they are highly involved (M=2.20, SE=.07 on the log scale, or 8.03 words) and when they are lowly involved (M=2.14, SE=.07 on the log scale, or 7.49 words) (see Table 4). On the other hand, the Chinese participants used significantly more cognitive words when they are highly involved (M=2.34, SE=.07 on the log scale, or 9.39 words) than when they are lowly involved (M=1.93, SE=.07 on the log scale, or 5.88 words) (see Table 4). These results are illustrated in Figure 9.

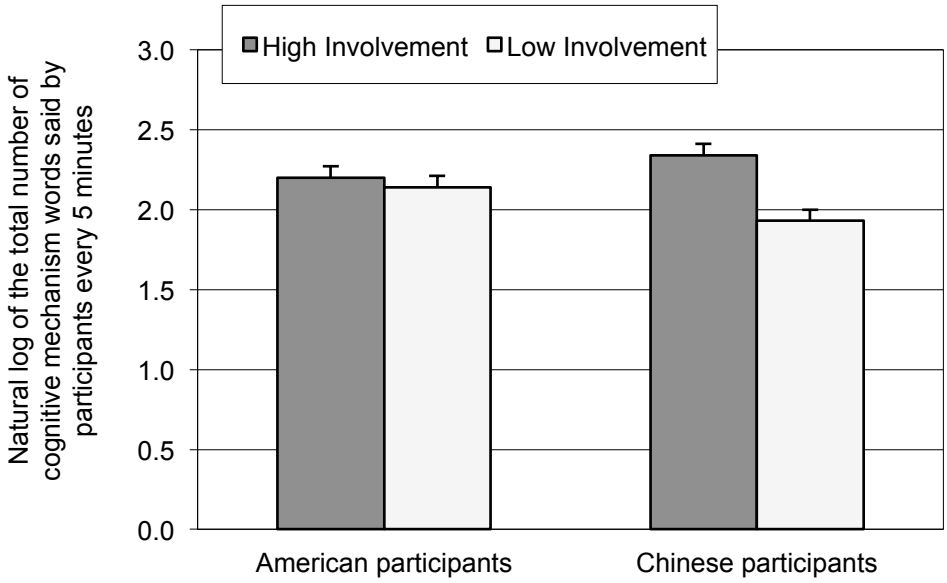

Figure 9: Natural logs of the numbers of cognitive mechanism words said by American and Chinese participants every 5 minutes in the high, and the low involvement conditions

Discussions

My first set of results provides preliminary evidence of the verbal adaptations participants make to express involvement in the absence of non-verbal cues. I found that participants used more definite articles, assent words, and cognitive mechanism words, and fewer self-reference pronouns when they are highly involved, even when controlling for the total number of words used. These results are consistent with findings from face-to-face studies (e.g., Cegala, 1989) and extend the results about language use and social cues in previous CMC studies (e.g., Pirzadeh & Pfaff, 2012; Convertino et al., 2008) by pinpointing which specific verbal cues were used by CMC participants to indicate involvement.

Moreover, the results are consistent with studies about deception behaviors in CMC. Hancock et al. (2007) proposed that when lying, participants had to use more cognitive effort, and said a lower number of self-reference words, and higher number of cognitive words in CMC. Inherent in the definition of involvement is the cognitive focus, and effort dedicated to the

current conversation. In my experiment, participants in the high involvement condition could dedicate their full attention to the conversation. Similar to Hancock et al. (2007), I also observe lower number of self-reference pronouns, and higher number of cognitive words in the high involvement/no-distraction-task conditions than in the low involvement/distraction-task condition.

On the other hand, unlike previous studies in face-to-face settings, I did not find any support for the higher number of certainty words, and lower number of uncertainty words. The IM environment offers the affordance of reviewability, as all utterances are recorded, and can be reviewed any time during the conversation. In face-to-face interaction, an utterance, once missed, cannot be retrieved (Voida, Newsletter & Mynatt, 2002). I think that because of this, in IM, participants are not necessarily uncertain about the flow of the conversation even when they are disengaged for a moment. In my experiment, participants in the low involvement condition could momentarily moved their attention away from the conversation to the distraction game, and then came back to check what they missed in the discussion. This is consistent with research by Gergle, Millen, Kraut, & Fussell (2004) showing that having a dialog history in the chat program helped collaborators in a task overcome memory limitations regarding the content of the dialog. Therefore, expressing and interpreting involvement based on certainty about the content and flow of the dialog do not seem to be effective in IM.

More importantly, in IM, involvement is expressed by how much participants actively process information in the conversation and respond to their partner. They can do this by referencing ideas and objects previously discussed with definite articles, by agreeing with or acknowledging their partner, and by expressing insights on the content of the exchange through cognitive words. However, since word counts do not take into account the context from the

whole sentence, or idea unit, there may be other meanings and uses of these word categories in our study. For example, some assent words, such as “yeah”, may be used as backchannel responses instead of agreement indicator (Clark, 2004).

The second set of results demonstrates that interaction involvement is in fact important to the quality of team collaboration regardless of the communication environment. In IM conversations, when a participant was distracted from the conversation, he or she tended to experience more frustration and annoyance than when he or she was involved. Such frustration and annoyance may have resulted from the lower level of understanding that these participants reported when being disengaged rather than fully involved. Participants also reported a more negative experience in collaboration when they were lowly involved as opposed to highly involved.

A participant’s low involvement in a conversation not only influenced his or her own experience but also that of his or her partner, who reported less satisfaction with the team collaboration than when that partner was interacting with highly involved participants. Even in text-only IM environment without non-verbal, audio or visual cues, participants were able to detect when their partners were not involved with them in the conversation. These results resonate with previous studies about social presence in CMC, which have suggested that participants were able to perceive emotions or mood in text-only IM (Guillory et al., 2011). In other words, participants adapt to the constraints of the text-based medium, and glean information from the limited verbal cues in IM to infer states such as involvement that in face-to-face conversation are conveyed by nonverbal behaviors (Walther et al., 2005). Taken together, the results suggest that even with the reviewability offered by IM, it is still important for remote team members to stay active and updated with the current conversation. This is because high

level of involvement of each team member will bring about higher understanding for everyone on the team, lower negative emotions, and thus higher level of satisfaction with the team collaboration.

I also found some interesting cultural differences in the ways American and Chinese participants used different verbal cues when they are highly, or lowly involved. For the American participants, there was a significant difference in the frequency of definite articles they used when highly involved, and when lowly involved. Such difference was not significant for the Chinese participants. Chinese participants who speak English as their second language tend to omit articles in their English sentences, as the Chinese language does not have functional equivalents of the English articles (Robertson, 2000). This unfamiliarity with the English articles of the Chinese speakers might explain why for Chinese participants, definite articles did not play a significant role in their verbal expression of involvement. I also found that American participants said significantly more indefinite articles than Chinese participants in general, which illustrated the Chinese participants' tendency to omit articles in places where native English speakers would use one.

On the other hand, I found that Chinese participants used significantly more cognitive mechanism words when they are highly involved than when lowly involved, while American participants did not differ in their use of this type of words in different involvement conditions. Setlock et al. (2007) found that the task-oriented American pairs said more cognitive mechanism words in general than the relationship-oriented, collectivistic Chinese pairs. My result is an interesting addition to what Setlock et al. (2007) found. It implies that the relationship-oriented Chinese participants may appear to become more task-oriented through using more cognitive mechanism words when they are highly involved in the discussion. Some studies have found that

the difference in terms of task-work vs. relationship orientation between the American participants and the Chinese participants may cause frustration for intercultural team members (e.g., Nguyen & Fussell, 2012). This result may suggest a way to reduce such difference in intercultural conversations, at least in the team members' perception, and improve collaboration.

This study results suggested that personal pronouns and assent words were used differently when the speaker was highly or lowly involved. However, this study still did not clarify whether the varying frequency of these types of words said by a speaker will be perceived by the receiver in a conversation as expressing varying level of involvement. In other words, my study 1 only examined involvement cues in CMC conversation from the encoding perspectives. Coker & Burgoon (1987) emphasized the importance of studying both the encoding and the decoding of involvement cues in conversation. Therefore, I conduct a second study to examine whether participants can interpret the level of involvement of the partner through the partner's use of personal pronouns and assent words. This study will be introduced in the next chapter.

CHAPTER 4

STUDY 2: INTERPRETATION OF INVOLVEMENT CUES IN IM CONVERSATIONS

As Coker & Burgoon (1987) suggested, it is important to examine verbal cues of involvement from both the encoding (how people use them to express involvement) and the decoding perspectives (how people infer involvement from seeing or reading these cues). My first, and the main study, explore the verbal cues of involvement from an encoding perspective. My second study investigates them from a decoding perspective, and thus also provides confirmation for the results of the first study.

The results of the first study show that participants rated their partners low in the level of involvement when the partners had to play the distraction game, and high in involvement when they did not. Such results indicate that participants had a way to detect the involvement of their partners from the cues available in the text-based IM environment. Moreover, these results also indicate that participants used more assent words, and fewer personal pronouns when they are highly involved in the conversation. Viewing the results of study 1 from the decoding perspectives of how participant interpret involvement cues, I ask the following research questions:

RQ1: Do participants rely on the frequency of these verbal cues (e.g., personal pronouns and assent words) to assess the level of involvement of their partners, and also other aspects of the partner's communication process such as the level of understanding?

RQ2: Do the frequencies of these verbal cues used by the partner influence the participants' experience during the conversation?

To answer the two questions, I conducted a second study in which I asked participants to view recordings of IM conversations between two students who used varying number of personal

pronouns, assent words, and total number of words, and provide ratings of their levels of involvement, understanding, and other communication outcomes. Even though in study 1, I also found that definite articles and cognitive mechanism words are important indications of involvement, I choose to vary the number of personal pronouns and assent words in this study only, for 2 reasons. First, according to research by Pennebaker & colleagues, these types of verbal cues are used more frequently, and thus, easily influence participants' perception of various communication processes (see Campbell & Pennebaker, 2003). Second, to reduce confounding effects resulting from the manipulation of multiple verbal cues, I choose two verbal cues that are both related to one aspect of perceived involvement: the orientation to the partner, and inclusion of the partner in the conversation, which, as my study 1 shows, plays an important role in the perception of involvement in text-based IM conversations. In this study, I will not consider cultural differences in the perception of involvement based on the use of personal pronouns and assent words, because in the first study, I didn't find any significant cultural difference in the way American and Chinese participants used these two types of verbal cues in the high and low involvement conditions. However, future studies may investigate such cultural differences for other types of verbal involvement cues.

Methods

In this study, I asked each participant to fill out an online survey. This online survey required the participant to watch closely 4 different 3.2-minute screen recordings of 4 different IM conversations between 4 different pairs of Cornell students discussing various on-campus locations to put a new Cornell Dairy Bar outlet. After watching the each of the four recordings, each participant answered a set of questions about the level of involvement, and understanding of

each Cornell student in the recording, and also about their general feeling when they hypothetically had to collaborate with these Cornell students.

Participants. 50 students (14 males, 2 aged 25-31 and 48 aged 18-24, 3 graduate students and 47 undergraduates) studying at a large American university were recruited for a 10$ e-gift card. All students are fluent or near fluent in English. There were 3 international students who have been in North America for 5 years or less. Of these 3 international students, 2 are from China, Hong Kong or Taiwan, and speak Chinese as the native language, and 1 is from India. The remaining 47 participants have been in North America for more than 10 years. Of these 47 participants, 40 were born and raised in North America and speak English as the native language.

Materials and procedures. Each participant will answer an online survey, hosted on https://cornell.qualtrics.com, consisting of 6 parts. The first part contains the consent form, and questions about the settings of their computer and Internet browser in order to provide appropriate instruction about viewing the videos embedded in the survey. The second, third, fourth, and fifth part of the survey have the same format, and consist of similar sets of questions. These four parts are the main content of the survey. In each of these four parts, participant will first be introduced to the discussion that they are going to watch, about the pros and cons of different campus location to open a new outlet for Cornell Dairy Bar. Then participants are asked to watch a screen recording of an IM conversation between two Cornell students. After watching the screen recording, participants answer at set of questions regarding the recording. For these four parts, participants will watch 4 different screen recordings of 4 different conversations, between 4 different pairs of Cornell students. However, they answer the same set of questions about each of these screen recordings. Part 6 of the survey consists of demographic questions. All the questions and instructions I used for all parts of the survey are presented in the Appendix.

Screen recording of IM conversations. Each participant viewed 4 different recordings of 4 different conversations between 4 different pairs of students, and answered the same set of questions about these recordings. These 4 recordings are the manipulation of this second study. First, I manipulated the number of personal pronouns and assent words the students said in the recorded IM conversations. Each IM conversation was recorded from the perspective of one student, the first student. The typing of this first student was therefore shown in the recording. Across the four recordings that each participant viewed, the number of assent words and personal pronouns that the first student in each recording said was kept the same (even though this first student was a different person saying different content in each recording). The number of personal pronouns and assent words that the second student, henceforth the target communicator, said varied across the 4 recordings. Since the recordings were not taken from the perspective of the target communicator, his or her typing was not shown in the recordings. There were recordings in which the target communicator said a low number of personal pronouns (1 in the 3.2-minute recording) and a high number of assent words (8). According to the results from the first study, this is the case when the target communicator displayed high level of involvement. There were recordings in which the target communicator said a high number of personal pronouns (5) and a low number of assent words (2). According to the results of the first study, this is when the target communicator displayed low level of involvement.

Second, I manipulated the total number of words said by the students in the recording. The total numbers of words that the first student said across the 4 recordings were kept the same (118 words in total in the 3.2-minute recording, 1 personal pronoun, 8 assent words). For the target communicator, there were recordings in which he or she said a high total number of words (120 words), and recordings in which he or she said a low total number of words (80 words).

Combining the first and second manipulations, I have a 2 by 2 within-subject design: high or low level of involvement displayed through the use of personal pronouns and assent words, and high and low total number of words said. Based on this design, each participant in the study would watch 4 recordings: 1) one in which the target communicator said a high total number of words, a low number of personal pronouns and a high number of assent words; 2) one in which the target communicator said a low total number of words, a low number of personal pronouns and a high number of assent words; 3) one in which the target communicator said a high total number of words, a high number of personal pronouns and a low number of assent words; 4) one in which the target communicator said a low total number of words, a high number of personal pronouns and a low number of assent words. This 2x2 within-subject design is displayed in Table 5. Each participant in the study would view 4 recordings satisfying these 4 conditions.

To account for variations in the content of the discussion that may influence the frequency of assent words and personal pronouns used I created 4 different vignettes. Each vignette is a conversation between two Cornell students about the pros and cons of two different locations on Cornell campus to open a new outlet of Cornell Dairy Bar. The students, and the content of each vignette are displayed in the Appendix. These vignettes were created based on the chat logs I collected from the first study. For each of these vignettes, I made up 4 conversations in which the first student said exactly the same content word for word, but the target communicator said a varying number of personal pronouns, assent words, and total number of words according to the 2-by-2 within-subject design presented in Table 5. Each participant in this study would view 4 different recordings, one each from these 4 different vignettes between these 4 different pairs of students. Moreover, as mentioned previously, each of these 4 different recordings satisfied one of the 4 conditions presented in Table 5. In summary,

each participant in the study viewed 4 different vignettes between 4 different pairs of students, satisfying 4 different conditions.

Table 5: 2 x 2 within subject design of the second study: Number of personal pronouns, assent words, and total number of words said by the target communicator in the 4 recordings

Level of involvement	**High**	**Low**
Number of words said		
High	- 1 personal pronoun - 8 assent words - 120 words total	- 5 personal pronouns - 2 assent words - 80 words total
Low	- 1 personal pronoun - 8 assent words - 80 words total	- 5 personal pronouns - 2 assent words - 120 words total

Finally, since the design of the study is within-subject, to account for the order effect, I randomize the order in which I presented the 4 recordings to the participants. Since there are a great number of possible orders by which to present the 4 recordings to the participants, I only chose 32 typical randomizations, and balanced the number of participants that were presented each randomization.

Procedures. Participants were recruited using flyers around campus, and postings on social networks, and Cornell's Participant Recruitment System for Social Science Studies called SUSAN. Participants followed a link to the online survey. On the first page, participants read the consent form, and acknowledge their consent to participate. Next, participants answered questions about their computer's configuration and Internet browser types, and were presented with appropriate instructions to view embedded video files in the survey. Then, participants read the instructions about the first recordings they would view. Next, they would view the first recording. After viewing, participant clicked next to move on to the next page where they had to answers questions regarding the first recording. The same procedure was repeated for recordings

2, 3 and 4. Then, on the last page of the survey, participants answered demographic questions, were thanked, read the information regarding the $10 electronic gift card they would receive as compensation, and recorded all their answers to the online survey.

Measures. I collected three major sets of measurements from the survey. First, participants answers some questions about the first students, under whose perspective the IM conversations were recorded. These questions made up the first set of measurements, which is the participants' evaluation of the first students' communication processes during the IM conversation. Second, participants answers questions about the communication processes of the target communicators. These questions made up the second set of measurements, which is the participants' evaluation of the target communicators' communication processes. Third, I asked participants to imagine they were the first students in these IM conversations, and to answer questions about their general experience in chatting with the target communicators. These questions made up the third set of measurements, which is the participants' general reaction towards the target communicators (such as liking, or emotion reaction) in the conversations. These three sets of measurements are the dependent variables in this study.

Evaluation of the first students' involvement. Participants rated how involved in the conversation the first students were. Based on study 1, I chose 4 items from Cegala's Interaction Involvement Scale (Cegala, 1981) (see Appendix) with some adaptation to suit the context of the study. Test of reliability of these 4 items produced good Cronbach's α value of .845. Ratings for these 4 items were averaged to compute the level of involvement for the first students.

I also asked participants to answer a single question about how involved or committed they thought the first students were in the conversation (1=not at all involved, 7=very much involved). The ratings were negatively skewed, so I recoded the data into three categories (1 to 4

=1, 5 to 6=2, and 7=3), roughly corresponding to low involvement, average involvement, and high involvement.

Evaluation of the target communicators' involvement & understanding. Similarly, participants also rated the target communicators' level of involvement by answer 4 questions adapted from Cegala's Interaction Invovlement Scale. Test of reliability of these 4 items produced good Cronbach's α value of .790. Ratings for these 4 items were averaged to compute the level of involvement for the target communicators.

Participants also answered a single question about how involved or committed they thought the target communicators were in the conversation (1=not at all involved, 7=very much involved). The ratings were negatively skewed, so I recoded the data into three categories (1 to 4 =1, 5 to 6=2, and 7=3), roughly corresponding to low involvement, average involvement, and high involvement, in the same way I recoded the ratings for the involvement of the first students.

Participant answer a single question on a 7-point scale about how much the target communicators understood the first students in the conversations (1=not at all, 7=very much). The ratings were negatively skewed, so I recoded the data into three categories (1 to 4 =1, 5 to 6=2, and 7=3), roughly corresponding to low understanding, average understanding, and high understanding.

Reaction towards the target communicators in the conversations. I asked the participants to imagine they were the first students chatting in IM with the target communicators. Then they answered questions about their emotional reaction (frustration and annoyance) towards the target communicators, as well as their general experience when chatting with the target communicators.

Frustration when chatting with the target communicators. Participants' ratings, on a 7-

point scale (1=not frustrated at all, 7=extremely frustrated), of how frustrated they thought they would feel when interacting with the target communicators were positively skewed, so I recoded the data into three categories (1 =1, 2 to 3=2, and 4 to 7=3), roughly corresponding to low frustation, average frustration, and high frustration.

Annoyingness of the target communicators. Participants' ratings, on a 7-point scale (1=not annoying at all, 7=extremely annoying), of how annoying they thought the target communicators were during the conversation were positively skewed, so I recoded the data into three categories (1 =1, 2 to 3=2, and 4 to 7=3), roughly corresponding to low, average, and high annoyance.

General experience when chatting with the target communicators. Similarly to study 1, 4 questions were taken from Wang, Fussell, & Setlock (2009) study about team interaction to make up the measurement for the general experience participants felt about the collaboration with the target communicators (Cronbach's α=.895). These include questions about the participants' liking of the target communicators, and their comfort and enjoyment of the discussion (see Appendix). Ratings for these 4 items were averaged to compute the general experience score.

Results

To test the research question of whether participants can infer the level of involvement of the two students in the IM conversation they watched, when the students used different numbers of assent words, personal pronouns, and total number of words, I conducted a mixed model ANOVA on several measurements collected from the survey. Since the target communicators were those that used varying numbers of personal pronouns, assent words, and total number of words in the recordings, I conducted tests on the ratings for the target communicators, including:

1) the target communicators' involvement, 2) the target communicators' understanding, 3) the annoyingness of the target communicator and the frustration resulted from conversing with him or her, 4) the general positive experience resulted from conversing with the target communicator (see Appendix for the correlations among these variables). The mixed model ANOVA has 3 main fixed effects: 1) the involvement condition (high or low, depending on the number of assent words and personal pronouns used, as shown in Table 5), 2) the total number of words said (high or low), and 3) the interaction between these two. I considered the effect of the participants' gender on these variables, but did not find any significant result. I accounted for the random effects of the survey participant, the vignette, and the order in which the 4 recordings were showed to the participant. The results are presented below.

The target communicators' level of involvement. I conducted a mixed model ANOVA of the form outlined above on the participants' evaluation of the target communicators' involvement, averaged from 4 items adapted from Cegala's Interaction Involvement Scale, as mentioned in Chapter 7, under the "Measures" section. I found a near significant positive effect of involvement condition on the target communicator's involvement (as rated by the participants) ($F[1, 146.8]=3.07$, $p=.08$). Participants rated the target communicators higher in involvement ($M=5.06$, $SE=.13$) when the target communicators used few personal pronouns and many assent words (high involvement condition) than when they used many personal pronouns and few assent words (low involvement condition) ($M=4.81$, $SE=.13$) (see Table 6, and Figure 10). I did not find any significant effect of the total number of words used ($F[1,102]=.01$, n.s), or interaction effect ($F[1, 102]=2.20$, $p=.14$).

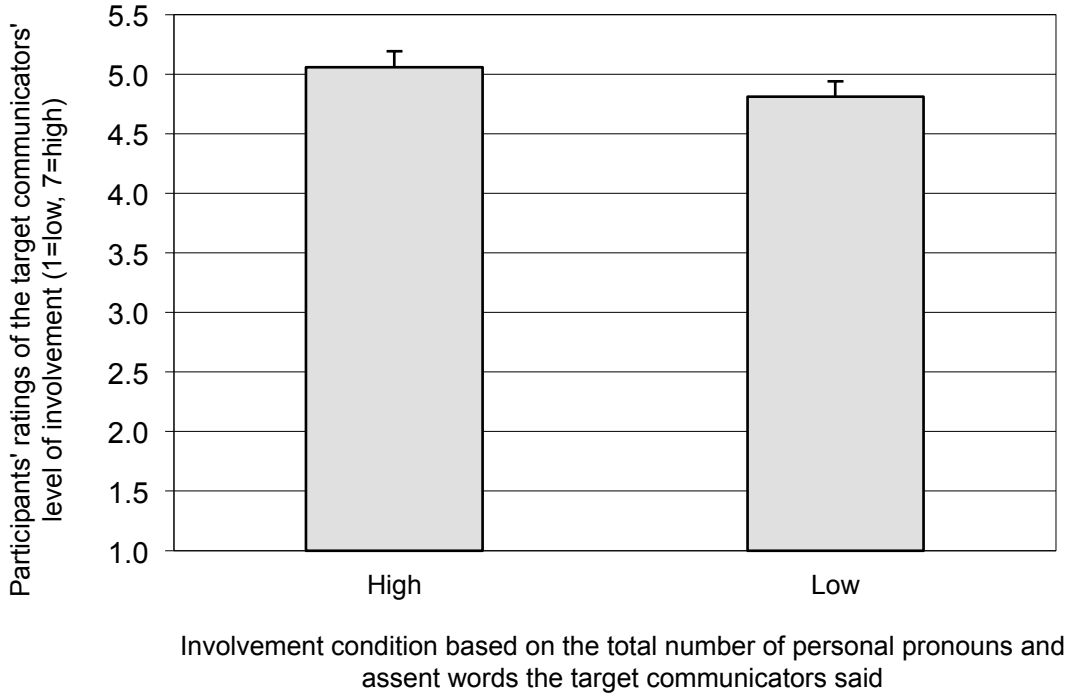

Figure 10: Study 2: Participants' ratings of the target communicators' level of involvement in the IM conversations, in two involvement conditions

Table 6: Means, and standard errors of participants' ratings of the target communicators' annoyingness, and frustration with the target communicators in different conditions.

Level of involvement	**Number of words said**	**High**	**Low**
Target communicators' involvement		M=5.06, SE=.13	M=4.81, SE=.13
Target communicators' annoyingness	High	M=2.13, SE=.09	M=1.98, SE=.09
	Low	M=1.92, SE=.09	M=2.18, SE=.09
Frustration with target communicators		M=1.96, SE=.07	M=2.11, SE=.07
General experience if talking to target communicators		M=4.96, SE=.15	M=4.49, SE=.15
	High	M=4.94, SE=.15	
	Low	M=4.51, SE=.15	

The target communicators' level of understanding. I conducted a mixed model ANOVA of the form outlined above on the participants' evaluation of the target communicators' understanding. I did not find any significant effect of the involvement condition ($F[1,146.1]=2.05$, $p=.15$), the total number of words used ($F[1, 144.4]=1.04$, $p=.30$), nor interaction effect ($F[1, 144.4]=.85$, n.s) on the target communicators' level of understanding as rated by the participants. In other words, there was no significant difference in the evaluation of the target communicators' understanding between different involvement conditions, total numbers of words used by the target communicators, or between different combinations of involvement conditions, and total number of words used.

The target communicators' level of annoyingness. I conducted a mixed model ANOVA of the form outlined above on the participants' evaluation of the target communicators' annoyingness. I did not find any significant effect of involvement condition ($F[1, 143.4]=.35$, n.s), or the total number of words used ($F[1, 145.7]=.08$, n.s). But I found a significant interaction effect ($F[1, 145.7]=5.78$, $p=.01$). This means that participants rated the target communicators different levels of annoyingness under different combinations of the total number of words used and involvement conditions. Participants rated the target communicators most annoying when they said a low number of words, a high number of personal pronouns, and a low number of assent words (the LL condition according to Table 5), followed by when they said a high number of words with varying number of personal pronouns and assent words (the HH and HL condition, according to Table 5). Participants rated the target communicators least annoying when they said a low number of words, a low number of personal pronouns, but a high number of assent words (the LH condition according to Table 5). A post-hoc Student's t test showed that only the difference between the LL condition (with the highest ratings for annoyingness) and the

LH condition (with the lowest ratings for annoyingness) was significant. All other differences between other conditions were not. Figure 11 displays the differences in the level of annoyingness among the 4 conditions, and Table 6 reports the mean and SE in each condition.

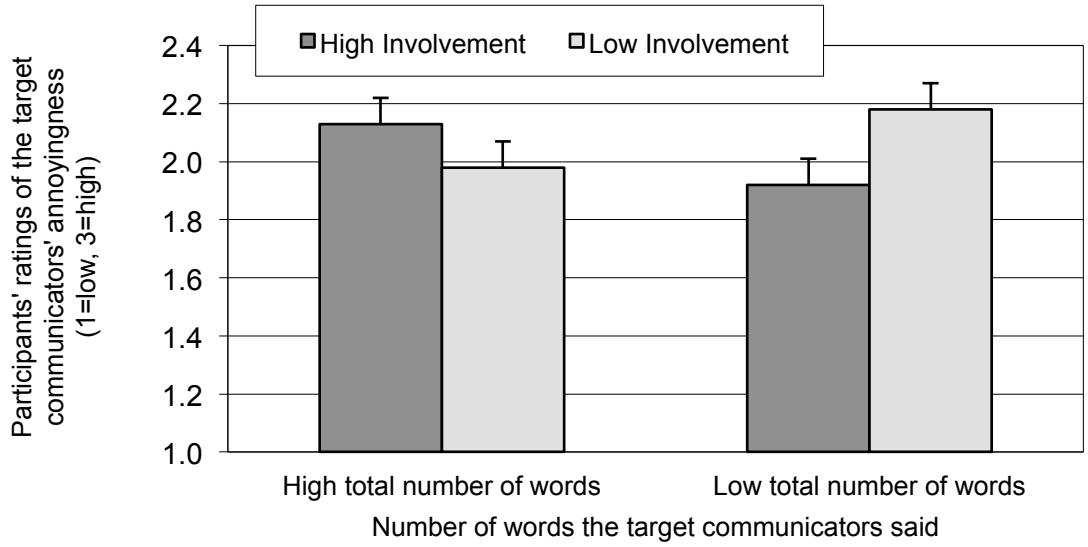

Figure 11: Study 2: Participants' ratings of the target communicators' annoyingness under different conditions, in terms of the total number of words used, and involvement conditions

The level of frustration when talking to the target communicators. I conducted a mixed model ANOVA of the form outlined above on the participants' evaluation of how frustrated they would have been if they had conversed with the target communicators. I did not find any significant effect of the total number of words used ($F[1, 145.8]=.08$, n.s), nor interaction effect ($F[1, 145.8]=2.04$, $p=.14$). But I found a near significant negative effect of involvement condition ($F[1,142.4]=3.76$, $p=.05$). Participants felt less frustrated ($M=1.96$, $SE=.07$) when the target communicators used few personal pronouns and many assent words (high involvement condition), and felt more frustrated ($M=2.11$, $SE=.07$) when the target communicators used many personal pronouns but few assent words (low involvement condition) (see Table 6).

General experience if talking to the target communicators. Finally, I conducted a mixed model ANOVA of the form outlined above on the participants' evaluation of their general experience (liking, comfort, etc…) if they were to converse with the target communicators, based on 4 items adapted from Wang et al. (2009) as mentioned in Chapter 7. I found a significant positive effect of involvement condition ($F[1, 146]=11.51$, $p<.001$). I also found a significant positive effect of the total number of words used ($F[1,144.4]=9.92$, $p<.01$), but no interaction effect ($F[1, 144.4]=.15$, n.s). Participants reported a more positive experience when the target communicators used few personal pronouns and many assent words (high involvement condition) (M=4.96, SE=.15), than when the target communicators used many personal pronouns but few assent words (low involvement condition) (M=4.49, SE=.15). Moreover, participants reported a more positive experience when the target communicators used a high total number of words (M=4.94, SE=.15), than when the target communicators used a low total number of words (M=4.51, SE=.15) (see Table 6). Figure 12 and Figure 13 present the differences in the participants' reported level of positive experience under different conditions.

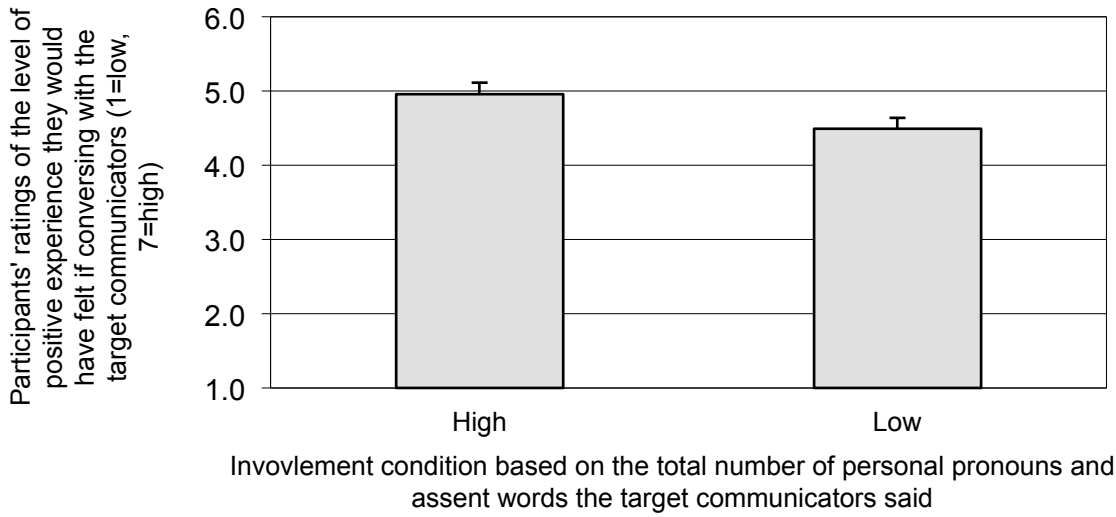

Figure 12: Study 2: Participants' ratings of the level of positive experience they would have felt if conversing with the target communicators, in two involvement conditions

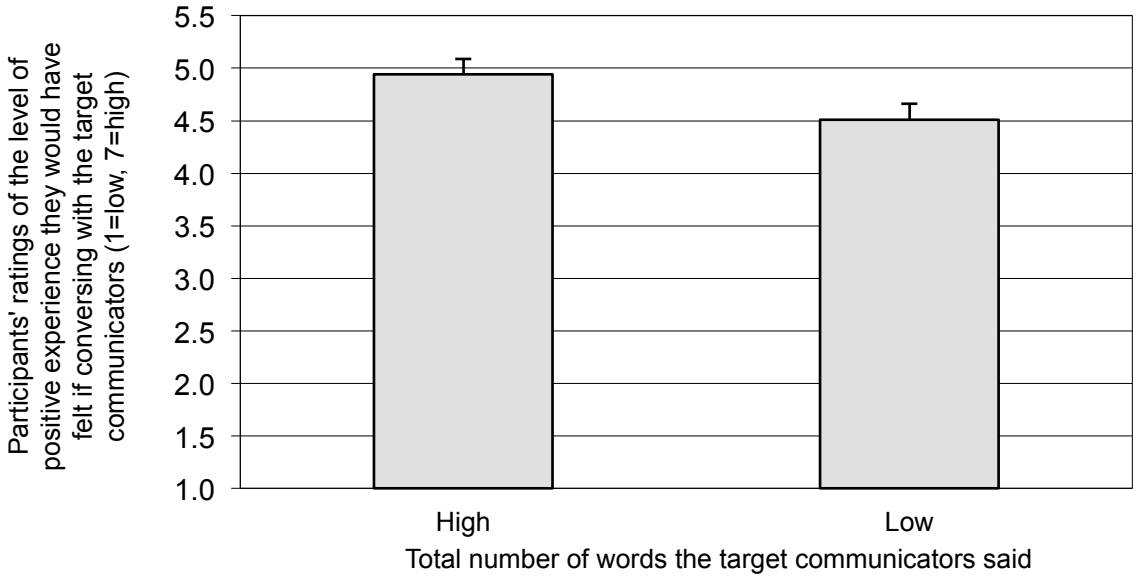

Figure 13: Study 2: Participants' ratings of the level of positive experience if conversing with the target communicators, when the target communicators said different total numbers of words.

Discussion

The main research question for this study is whether participants as third-person observers can detect the level of involvement of the target communicator in the IM conversation when that person used different numbers of personal pronouns and assent words. This research question was inspired by the results of study 1 that participants in a text-based IM conversation tend to use more assent words and fewer personal pronouns when they are highly involved than when they are not, and that their partners were somehow able to correctly derive their level of involvement using just the cues available in the text-based environment. In this study, I found that indeed participants correctly rated high or low involvement based on the number of personal pronouns and assent words used, but not based on the total number of words. This finding implies, interestingly, that being more talkative may not be enough to show involvement in a conversation. Conversational partners rely not only on the frequency of talking activities, but also on the content of such talking activities to interpret the level of involvement of each other.

Moreover, combined with the results from study 1, this result confirmed that the use of personal pronouns and assent words is important for conveying involvement in conversation. According to previous studies, using personal pronouns indicates self-consciousness and an inward orientation to the individual (Campbell & Pennebaker, 2003). On the other hand, using many assent words indicates an attention to the communication partner, which is an important part of interaction involvement (Sherhorne, 1999). So participants tended to perceive higher involvement from people who displayed low level of preoccupation with themselves (by using few personal pronouns) and more partner orientation (by using many assent words).

I also found some interesting results regarding participants' level of comfort if they had conversed with the target communicators, and regarding their ratings of the target communicators' annoyingness. First, participants rated the experience talking to the target communicators more positively when the target communicators used the same style regarding the frequency of pronouns and assent words. As previous studies suggested, the use of personal pronouns tend to suggest a focus on one's self, and a subtle proclamation of ownership on ideas (Campbell & Pennebaker, 2003). In a collaborative discussion, when two collaborators need to reach convergence on a decision, a high frequency of personal pronouns may subtly suggest a reluctance to cooperate, or to listen to the partner. In contrast, the frequent use of assent words tended to signal openness and consideration of the partner's opinions (Jones et al., 1999). Therefore, participants tended to prefer collaborating with partners who used many assent words but few personal pronouns.

Second, I found an intriguing pattern of results regarding participants' ratings of how annoying the target communicators were. When the target communicators were talkative (saying a high total number of words) there is no difference in the ratings of annoyingness between the

two cases in which the target communicators used different frequency of personal pronouns and assent words. But when the target communicators did not say much overall, they would be rated more annoying to work with when they used many personal pronouns and few assent words, then when they used few personal pronouns, and many assent words. When the target communicators did not say much, and thus did not contribute much to the collaborative task, their personal pronouns and assent words usage became salient and influenced the annoyance and frustration of their partners. Consistent with the results regarding involvement, the frequent use of assent words and reduction in personal pronouns, which might indicate openness and willingness to collaborate helped to reduce perception of annoyingness if the participants had conversed with them. These results have important implications for remote team collaboration. When some team members are reticent, or prefer to cautiously contemplate their ideas before contributing to the conversation, they may consider appropriate usage of personal pronouns and assent words in order to reduce negative emotions such as annoyance or frustration in their partners, thus helping to ensure team harmony and task efficiency.

CHAPTER 5

GENERAL DISCUSSION & CONCLUSION

In chapter 3 and chapter 4, I have provided details explanations about each result I found in my first and my second study. In this chapter, I first review these two studies together and discuss the significance of their results as a whole. Moreover, as a concluding chapter to the dissertation, I then relate the discussion in this chapter back to the introduction, and analyze the contributions of my two studies to the CMC literature, as well as the practical implications of my results. Finally, I discuss the limitations of my studies, and conclude with future directions for research about interaction involvement cues in computer-mediated intercultural conversations.

This dissertation aims at bridging an important literature gap in computer-mediated-communication research, which is the question of how people adapt their communication behaviors to convey interaction involvement in text-based environments, normally without usual visual and audio affordances that are important for the expression and interpretation of involvement in traditional face-to-face settings. To answer this question, I conducted two studies, each one approaching the research question at a different perspective. The first study explored the encoding of verbal interaction involvement cues in dyadic IM conversations, in other words, what kind of verbal cues participants in an IM conversation used to express high and low level of involvement. The second study investigated the decoding of verbal interaction involvement cues, or whether participants were able to derive high or low level of involvement of the speakers through the speakers' use of different verbal cues in an IM conversation.

The results from my first study suggested that the frequency of personal pronouns, definite articles, assent words and cognitive mechanism words were important for the expression of interaction involvement. The use of these verbal cues indicated active participation and

response to specific content in the conversation, and signal attention to the interaction partner, which is consistent with the definition of interaction involvement. The first study also reaffirmed the important role of involvement in conversations, even in a text-based IM environment. Participants working with a highly involved partner reported being more satisfied and liking the partner more than those working with a lowly involved partner. The results of the second study confirmed the hypothesis that participants based on the frequency of personal pronouns and assent words said to interpret level of involvement. They also suggested that the speaker's use of these verbal cues influence how this speaker was evaluated in terms of communication competence by a third-person observer. Taken together, the results from my two studies implied that interaction involvement is important for remote team collaboration in CMC, since it affects the outcomes of other communication processes such as the development of mutual understanding. More importantly, these results shed light on the important question of how participants in IM conversations, without the much-needed visual and audio cues, can still adapt to, and convey involvement in their message exchanges, by confirming the important role of linguistic cues in human interaction. Pronouns and assent words are used in most languages. My results, consistent with, and extending Pennebaker's (e.g., Campbell & Pennebaker, 2003), and Clark's research (e.g., Clark, 2004), showed that pronoun use and assent words are important indicators of two communication processes: the development of involvement, and the building of mutual understanding. From both an encoding and decoding perspective, the level of involvement of a speaker in a conversation were expressed and interpreted from the frequency of personal pronouns and assent words used. More interestingly, mere intensity of utterances in a conversation was not enough to communicate involvement to the conversational partner. Speakers in a conversation are perceptive towards subtle meanings conveyed in the use of

various linguistic features, such as pronouns, or assent words. Their evaluation and expression of involvement depend on a combination of how much their partner said, and what was said. These results have important contributions to CMC theories, as well as practical applications. I turn to these contributions next.

Theoretical Contributions

The first theoretical contribution of this dissertation, to the computer-mediate communication literature, is the extension of SIP, and other CMC theories that suggest despite the lack of visual and audio cues, people may still be able to convey relational messages, emotions, or status during conversations. The results I found clarified what specific types of verbal cues are useful for the expression and interpretation of involvement; therefore provided us more clue to the question of how people adapt their communication styles and behaviors to text-based communication. Moreover, the fact that I did not find any significant result regarding the role of qualifiers and intensifiers in the expression of high and low involvement, unlike the results of previous face-to-face studies, inspired, and invited examination of an important difference between text-based IM and face-to-face interaction that may influence the communication behavior of CMC participants. This difference is the reviewability of text-based IM, providing the participants a short history of the conversation so that they can be more certain about the content of the conversation even if they were, at some point, disengaged for a short time. Not many studies have investigated how reviewability, an important affordance of computer-mediated environment affect communication processes. My dissertation calls attention to a promising area of CMC research.

The second contribution is to the literature about participation in CMC. Many studies, especially about group collaboration in computer-mediated environment examined the impact of

the new affordances of CMC on team members' participation in group discussion, such as anonymity, or the level of social presence of each member, or of the group as a whole (e.g. McLeod, 2011; Lowry et al., 2006; Strauss, 1996). These studies tended to link higher level of participation to higher satisfaction among group members, or better group performance. Many of them aimed at exploring different antecedents of group participation in computer mediated discussion (e.g., McLeod, 2011). The results from my dissertation add to this literature by suggesting that mere participation may not be enough to ensure better outcomes of communication processes. The content and relevance of participation, which carry subtle but significant cues to involvement such as the orientation towards partners and inclusion of partners in conversation, play an important role in maintaining a high level of mutual understanding, reducing frustration and annoyance, as well as providing a general positive experience for the team members. Moreover, as my studies show, high level of participation is directly associated with high level of involvement. The study of involvement thus may inform the research about the factors influencing participation in group computer-mediated communication.

The third contribution is to the research about involvement in conversation. My first study is one of the few studies about involvement that actually manipulated the level of involvement of participants. Therefore, this study helped bridge the important gap in involvement research by linking the cognitive involvement and its behavioral expression. Secondly, in both of my studies, I made use of Cegala (1981) interaction involvement scale in a different way that the scale was originally designed: to measure involvement not as a trait but as a process outcome, varying at different times during a conversation. As I discussed in chapter 1 and 2 of this dissertation, one of the important limitation of current communication research about involvement is the measurement of the concept. Measuring involvement based entirely on

communication behaviors such as non-verbal cues missed the important cognitive dimension of involvement. But the few self-reported involvement scales developed have been used to measure involvement as a trait, as in Cegala's work. My dissertation suggested a way to combine different measurements to tap at both the cognitive, and the behavioral aspects of interaction involvement, while keeping the definition of involvement as a process.

The fourth contribution is to intercultural communication research. In my first study, I found some interesting differences in the way American and Chinese participants expressed involvement with verbal cues. Few cross-culture communication studies have investigated how involvement is expressed in different cultures. My results provide one of the first clues to how certain English verbal cues are used differently for American and Chinese participants, thus have implications for the study of communication processes in intercultural conversation. Moreover, they also provide suggestions to better support intercultural team collaboration, since maintaining the appropriate level of involvement in communication of all team members is crucial for success, as my results showed.

Practical Implications

The findings from this study also carry practical applications. In teamwork, IM provides a quick and easy communication solution for geographically dispersed collaborators (Isaacs et al., 2002). But does IM introduce other costs to the interaction? How can we design IM (or other text-based communication tools) to improve mutual understanding, satisfaction, and enjoyment of dispersed participants during their conversation?

Previous tools designed to support attention in conversations focused on non-verbal cues such as eye gaze (e.g., Xu, Li, & Wang, 2013). Our results show that it is also possible to detect the level of involvement of participants based on the verbal exchanges in the CMC conversation,

specifically the number of verbal cues like pronouns and assent words. Since it is important to help all parties in CMC maintain the right level of involvement, communication systems may help improve interaction by reminding participants about their own level of involvement. Group chat systems can be built with similar design to the GroupMeter system (Leshed et al., 2009), to display the level of involvement of each member in the conversation, with consideration of the member's culture.

In fact, previous studies have introduced innovative Chat systems such as Babbles (Erickson et al., 1998), which offer social visibility and awareness of people's attention in online chat. However, the features to support awareness in these systems, such as the auditory typing cues of Babble, mostly indicate the level of activity, or duration of focus. Our results suggested that involvement in a conversation is not only composed of the sheer amount of activities, but also a verbal orientation towards the partners, and increased responses towards what the partner said in the conversation. Therefore, systems to support awareness in IM may be augmented by a display of the involvement level of parties in a chat based on their verbal exchanges.

Multitasking when IMing at work is popular (Isaacs et al., 2002). Team members conversing via IM may therefore experience period of disengagement from the conversation, which will create an unpleasant experience for other teammates. Maintaining a good impression on teammates during these periods is therefore important for team performance and the interpersonal relationships among members. A previous study presented QnA, an IM tool augmented to help participants maintain a good impression on their partners in terms of involvement while multitasking in IM (Aoki et al., 2006). QnA called to attention the messages that participants need to address immediately.

Our results suggest another way systems can intervene to help participants maintain a

positive impression of their partner's involvement in the conversation. Our results suggested that systems may derive the level of involvement of participants based on verbal cues such as personal pronouns and assent words. Thus, systems may send warnings to those team members who seem to be distracted, encouraging them to keep their attention in the conversation, thereby reducing negative experience, not only for themselves, but for their partners in virtual conversations, as our results suggested.

Limitations & Future Directions

There are several limitations to my studies. For the first study, I only study dyads, while team interaction is more common for remote collaboration. I also did not collect a performance measure and therefore are unable to link involvement directly to collaboration outcome. The Gchat server, unfortunately, did not record to the seconds when each utterance from each participant was sent. Therefore, we could not analyze how fast each participant responded to the partner. Lastly, we also had a small sample size, which may limit the power of some of our results.

For the second study, I did not provide a manipulation check of whether participants notice the different use of personal pronouns, assent words, and total number of words said by the target communicators. Moreover, as discussed in chapter 4, the participants in my second study were third-person observers who did not take part in the conversations themselves, which might have prevented them from accurately rating the level of involvement of the target communicators.

In future work, to extend the first study, I intend to code agreements, disagreements and relational messages. This coding scheme will take into account the conversational context to classify idea units based on their meanings, instead of mere word counts. I also intend to conduct

a mediation analysis to examine what communication behaviors mediate the effect of involvement on other communication processes, such as understanding, and negative emotions. I also think that an analysis of how the levels of involvement of the two participants affect each other in the conversation will provide valuable insights to the study of interaction involvement as a communication process. In the first study, I collected various measurements at 4 different points of time. Therefore, sequential analyses of how these variables such as the level of involvement, or the frequency of pronouns, assent words, or articles change over time will also expand our understanding the dynamics of communication processes and behaviors. Moreover, all participants in my first study, even the Chinese participants, used English to converse. In future studies, the same design of study 1 can be used to discover how verbal cues in different languages, such as Chinese, are used by participants from different cultures, given that their sentences are correctly translated for mutual understanding. Future studies may also record the IM chat window of participants' conversations to capture the speed of response for analysis.

To extend on the second study, participants from different cultures may be recruited to watch the recordings and answer the survey questions. In this way, I can uncover the cultural differences in the ways verbal involvement cues are perceived and interpreted.

Conclusion

As the results of many studies, and my studies showed, the level of involvement in conversation affect the mutual understanding between conversational partners, and influence the general experience of the interaction. While in face-to-face conversations, non-verbal cues are available, and crucial for the expression and interpretation of involvement, in text-based Instant Messaging, which is more and more widely used nowadays, such cues are absent. The studies in my dissertation examined the use of verbal cues available in text-based IM to convey

involvement, from both a decoding and an encoding perspective. I discovered 4 specific verbal cues that participants in an IM conversation relied on to convey involvement: personal pronouns, definite articles, assent words, and cognitive mechanism words. Specifically, increased use of definite articles, assent words, and cognitive mechanism words indicated high level of involvement, while increased use of personal pronouns implied low level of involvement. I also found that definite articles played an important role in the expression of involvement for American participants, while for the Chinese participants, the use of cognitive mechanism words varied with varying level of involvement. These findings provide valuation contributions to the development of CMC theories, especially to the study of how people adapt their communication behaviors to different communication media with varying affordances. They also carry important practical implications for the design of communication tools to support appropriate level of involvement in team discussion, thus help improve task performance and team spirit.

I have always been fascinated by the way language use can tell us so much about a person's hidden thoughts and feelings. In the digital era when social interaction happens across chronological and spatial boundaries, part of the rich social cues are sometimes absent in computer-mediated environment. But it is with this lack of rich audio and visual cues that textual, linguistic cues reveal their concealed power, allowing people to maintain social presence through the conveyance of involvement, mutual understanding, or emotions. As James W. Pennebaker remarked in his book "The Secrets Life of Pronouns":

"The smallest, most commonly used, most forgettable words serve as windows into our thoughts, emotions, and behaviors."

I believe this dissertation is just a first step in my long quest to uncover the hidden treasures that linguistic style and word analyses can offer to the study of human communication.

APPENDICES

Questions used in communication processes survey, every 5 minutes of the discussion

Measurement	**Questions**
	1-Not at all 2-Very little 3 4-Neutral 5 6-Very much 7-Extremely
Frustration	On a scale of 1 to 7, how frustrated did you feel during your conversation?
Annoyance	On a scale of 1 to 7, how annoyed by your partner did you feel during your conversation?
Understanding	On a scale of 1 to 7, how much do you think your partner understood you during your conversation?
	On a scale of 1 to 7, how much do you think you understood your partner during your conversation?
Involvement (single-item)	On a scale of 1 to 7, how involved (committed, engaged) in the conversation do you think your partner was?
	On a scale of 1 to 7, how involved (committed, engaged) in the conversation do you think you were?
Involvement Scale Adapted from Cegala (1981).	1=Very rarely, almost never 7=Very frequently, almost always
	During the previous 5 mins of the conversation, I carefully observed how my partner responded to me.
	During the previous 5 mins of the conversation, I was sensitive to my partner's hidden or subtle meanings.
	During the previous 5 mins of the conversation, I pretended to be listening to my partner while in fact I was thinking about something else.
	During the previous 5 mins of the conversation, I was preoccupied and did not pay complete attention to my partner.
General experience	On a scale from 1 to 7, how much did you like your partner?
	On a scale from 1 to 7, how much did you feel liked by your partner?
	On a scale from 1 to 7, how comfortable are you in collaborating with your partner?
	On a scale from 1 to 7, how much did you enjoy talking with your partner?

Dictionary of words for different categories

Personal pronoun	***Relational pronoun***	***Intensifier***	***Qualifier***	***Assent***	***Cognitive Mechanism***					
i	We	absolut*	Could	accept	abandon*	but	ignori*	required	creating	why
i'd	Us	actual*	Hardly	accepta*	accept	careful*	implic*	requirement*	cuz	why's
id	We've	all	Don't know	accepted	accepted	caus*	incorporat*	requires	decid*	wish
i'll	We'll	altogether	Fair	accepting	accepting	clarif*	induc*	resolu*	defens*	wished
i'm	We're	a lot	Few	accepts	accepts	clear	infer	resolve	foundation*	wishes
i've	We'd	alright	General	agree*	achiev*	clog*	inferred	resolved	gather*	wishing
I	Our	always	I guess	alright*	acknowledg*	closure	inferring	responsib*	generate*	withheld
me	Ours	assur*	I think	fine	adjust*	cohere*	infers	restrain*	goal*	withhold
mine	Ourselves	barely	If	granted	admit	complete	influenc*	restrict*	grasp*	wonder
my	Let	believe*	Indecisive	indeed	admits	compreh*	inform	result*	guard*	wondered
myself	Let's	best	May	mmhmm	admitted	delay*	informs	retard*	held	wondering
idk (short		bet	Maybe	*	admitting	deni*	inhib*	rethink*	hence	would
for I don't		betting	Much	Ok	affect	deny*	initiat*	reveal*	hesitant	would'*
know)		certain*	Near	Okay	affected	depend	insight*	rigid*	hesitat*	wouldn'*
		clear	Not quite	True*	affects	depended	integrat*	root*	hold	yield*
		clearly	Seems	uhhu*	agree*	depending	intell*	saw	holding	reads
		completely	Some	yea	anal	depends	interfer*	secret	holds	realiz*
		confidence	Sort of	yeah	analys*	describe	justif*	secrets	hope	reason*
		*	Not sure	yep	analyz*	described	kind	see	hoped	reckon*
		confidently	Not that	Yes	answer*	describes	kinda	seeing	hopef*	recognis*
		couldn'*	Occasional	K (short	approv*	describing	knew	seem	hopes	recogniz*
		definite*	Perhaps	for ok)	arrange*	determina*	know	seemed	hoping	reconsider*
		distinctly	Possible		assum*	determine	knowing	seems	how	reconstruct*
		exact*	Possibly		avoid*	determined	knowl*	settl*	how's	reflect*
		fact*	Potential		aware*	determines	known	should	if	refrain
		faith*	Presumably		barrier*	determining	knows	should'*	ignore*	refus*
		firm*	Presume		bases	digest*	learn*	shouldn't	read	relate*
		forever	Pretty		basis	discern*	limit*	since	reading	relation*
		guarantee*	Probable		became	discl*	meaning	smart*	wanted	reluctan*
		indeed	Probably		because	discover*	meaningf*	solution*	wanting	remember*
		inevitab*	Seem		become	disregard*	means	solve*	wants	repress*
		never*	Might		becomes	done	meant	sort	welcom*	require
		positiv*	Misgiving		becoming	doubt*	mind*	sorta	what	unresolve*
		precisely	Kind of		believe	duties	motivate*	source*	what's	wait

Personal pronoun	*Relational pronoun*	*Intensifier*	*Qualifier*	*Assent*	*Cognitive Mechanism*					
		secure	More or less		believed	duty	motive*	stimul*	could	waited
		sure*	Mostly		believes	effect*	must	stop	could'*	waiting
		totally	Hesitate		believing	end	need	stopped	couldn't	waits
		truly	Doubt		block*	ended	needed	stopping	coz	want
		undoubt*	Feasible		concentrat*	ending*	needing	stops	create*	
		very	Hopefully		concern*	ends	needs	structure*	fit	
		At least	A little		conclud*	enlighten*	neglect*	stubborn*	fits	
		Best	About		conclus*	evaluat*	obstac*	suspect*	forbid*	
		Better	Almost		confess*	examine*	organize*	therefor*	forgiv*	
		Complete	Approxima*		confide	examining	organizing	think	found	
		Confident	Suppose		confided	expect*	origin	thinking	questioning	
		Constant	Suspect		confides	explain	ought	thinks	questionned	
		Definite	Uncertain		confiding	explained	outcome*	thought	questions	
		Determine	Usual*		confirm*	explaining	perceiv*	thoughts	quit*	
		Entire	Wonder		conflict*	explains	perception*	thus	rational*	
		Especially			confus*	explanat*	ponder*	tried	react*	
		Ever			consequen*	explor*	pretty	try		
		Evident			constrain*	fact*	prevent*	trying		
		Exact			constrict*	feeling*	produce*	understand		
		Exception*			construct*	feels	product	understandable		
		Explicit			contain*	felt	productive*	understanding		
		Extreme			contradic*	figur*	prohib*	understands		
		Full			control*	find*	purpose*	understood		
		High			cos	finish	question	undo		

Questions used in online survey for the second study

Part	*General Content*	*No*	*Question / Instruction*
1	Consent form	1	Participants to provide consent to participating in this study.
1	ID	2	Participant to provide email address
1	Technical configuration	3	Do you have Quicktime installed?
1	Technical configuration	4	What web browser are you using?: so that we can display the correct instruction for viewing videos embedded in the survey
2 (3, 4,5)	Instruction	5	On the next page is a screen recording of an IM chat session between Nat and Kit, two Cornell students who are discussing the opening of a new Cornell Dairy Bar outlet. Cornell Dairy Bar is an ice cream brand founded by the Food Science Department at Cornell, and sells ice cream and related products such as sundae, shakes, and cakes. Nat and Kit are discussing the pros and cons of opening a new outlet for Cornell Dairy Bar at different locations on Cornell campus, taking into account the flow of customers, profit, costs, and other benefits to the Cornell community and Ithaca area. Please watch the recording from start to finish, and pay close attention to the exchange between Nat and Kit. This recording is 3 minutes. The video needs some time to load. Please wait a moment. Then, look for the video controller at the bottom of the video. Click on the play button to start playing the video when you're ready. After watching the video, please scroll down for questions.
	Test question (to test whether the participants watched the recording)	6	Answer the following questions based on the content of the dialog you just saw in the recording. List at least 2 locations on Cornell campus that Nat and Kit discussed in the recording?
		7	Name one location that BOTH Nat and Kit clearly **did not like** for the new Cornell Dairy Bar outlet
		8	Give one reason why Nat and Kit did not like the location you just answered for the question above.
	Question about the **first** student in the recording. This recording was recorded **from the perspective of the first** student. The typing of the **first** student was thus recorded.	9	Please recall the recording you just watched. For each of the following questions, select the number that best reflects what you think about Nat's interaction in the recording you just watched. On a scale of 1 to 7, how involved (committed, engaged) in the conversation do you think Nat was?
			Nat was sensitive to the partner's hidden or subtle meanings.
		10	Nat carefully observed how his/her partner responded to him/her.
		11	Nat pretended to be listening to the partner while in fact Nat was thinking about something else.
		12	Nat was preoccupied and did not pay complete attention to the partner.
	Questions about the target	13	Please recall the recording you just watched. For each of the following questions, select the number that best reflects what you think about Kit’s interaction in the recording you just watched.

Part	*General Content*	*No*	*Question / Instruction*
	communicator , whose typing was not recorded		On a scale of 1 to 7, how involved (committed, engaged) in the conversation do you think Kit was?
		14	On a scale of 1 to 7, how much do you think Kit understood Nat in the conversation?
		15	Kit carefully observed how his/her partner responded to him/her.
		16	Kit was sensitive to the partner's hidden or subtle meanings.
		17	Kit pretended to be listening to his/her partner while in fact Kit was thinking about something else.
		18	Kit was preoccupied and did not pay complete attention to his/her partner.
	Questions about the experience when interacting with the target communicator	19	Now imagine that you were Nat in the conversation you just watched. Based only on how Kit responded in the recording, select the number that best reflects what you think about Kit as an interaction partner. On a scale of 1 to 7, how annoying do you think Kit was?
		20	On a scale of 1 to 7, how frustrated do you think you would be when interacting with Kit?
		21	On a scale from 1 to 7, how likable / amiable was Kit as a partner?
		22	On a scale from 1 to 7, how friendly was Kit towards the partner?
		23	On a scale from 1 to 7, how comfortable would you feel in collaborating with Kit?
		24	On a scale from 1 to 7, how enjoyable was the conversation with Kit?
Questions 5 to 24 repeated for part 3, 4, and 5. Participants viewed different recordings of different conversations between different pairs of students			
5	Demographic	25	What is your gender? Male Female
		26	What is your occupation? Undergraduate student Graduate student Full time employee Other – Specify:
		27	Are you fluent in English? Yes No
		28	What is your native language? English Chinese Other – Specify:
		29	What is your country of birth? Mainland China, Hong Kong, Macau, Taiwan North America Other – Specify:
		30	In which country did you spend the most of your childhood? Mainland China, Hong Kong, Macau, Taiwan North America Other – Specify:
		31	How old are you? 18-24 25-31 31-37 38-44 45+
		32	How long have you been in North America (US or Canada)? Less than 1 year 1 to 2 year 3 to 5 year 6 to 10 year 10 year or more

Correlations between the word counts of different categories in study 1

	Qualifiers, uncertainty	Intensifiers, certainty	Definite Articles	Indefinite Articles	Assent	Cognitive mech.	I pronouns
Qualifier, uncertainty	1						
Intensifiers, certainty	.437**	1					
Definite Articles	.492**	.581**	1				
Indefinite Articles	.428**	.589**	.493**	1			
Assent	.306**	.332**	.145*	.221**	1		
Cognitive mechanisms	.576**	.625**	.624**	.542**	.294**	1	
I Pronouns	.368**	.494**	.396**	.408**	.286**	.684**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between the communication process outcomes variables in study 1

	Self's involvement	Self's understanding	Self's frustration	Self's Annoyance	Partner's involvement	Partner's understanding
Self's involvement	1					
Self's understanding	.176**	1				
Self's frustration	-.339**	-.298**	1			
Self's Annoyance	-.241**	-.414**	.537**	1		
Partner's involvement	.266**	.343**	-.317**	-.332**	1	
Partner's understanding	.226**	.661**	-.337**	-.418**	.392**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The students (conversational partners) and the content of 4 different vignettes/conversations used in study 2

Vignette/conversation	First student	Target communicator	Content
1	Jo	Vic	Pros and cons of Cradit Farm Road, and West Campus for a new Cornell Dairy Bar outlet
2	Pat	Sam	Pros and cons of Collegetown, and Libe Slope for a new Cornell Dairy Bar outlet
3	Cal	Ira	Pros and cons of Cornell Cinema, and North Campus
4	Nat	Kit	Pros and cons of Campus Road, and Arts Quad

Study 2: Correlations between the communication process outcome variables for the 2nd student

	Student 2's Involvement	Student 2's Understanding	Student 2's Annoyingness	Frustration with Student 2	General experience with Student 2
Student 2's Involvement	1				
Student 2's Understanding	.543**	1			
Student 2's Annoyingness	-.472**	-.401**	1		
Frustration with Student 2	-.542**	-.509**	.605**	1	
General experience with Student 2	.483**	.435**	-.457**	-.533**	1

**. Correlation is significant at the 0.01 level (2-tailed).

REFERENCES

Ambady, N., Koo, J., Lee, F., & Rosenthal, R. (1996). More than words: Linguistic and nonlinguistic politeness in two cultures. *Journal of Personality and Social Psychology, 70*, 996–1011.

Aoki, P., Szymanski, M., Plurkowski, L., Thornton, J., Woodruff, A., & Yi, W. (2006). Where's the "party" in "multi-party"?: analyzing the structure of small-group sociable talk. *Proceedings of CSCW 2006*, 393-402.

Burgoon, J. K., Bonito, J. A., Bengtsson, B., Ramirez, A. Jr., Dunbar, N. E., & Miczo, N. (2000). Testing the interactivity model: Communication processes, partner assessments, and the quality of collaborative work. *Journal of Mangement Information Systems, 16*, *3*, 33-56.

Burgoon, J. K., & Le Poire, B. (1999). Nonverbal cues and interpersonal judgments: Participants and observer perceptions of intimacy, dominance, composure, and formality. *Communication Monographs*, *66*, 105-124.

Burgoon, J. K., Buller, D. B., White, C. H., Afifi, W., & Buslig, A. (1999). The role of conversational involvement in deceptive interpersonal interactions. *Personality and Social Psychology Bulletin, 25, 6*, 669-686.

Burgoon, J. K., & Newton, D. A. (1991). Applying a social meaning model to relational message interpretations of conversational involvement: Comparing observer and participant perspectives. *Southern Communication Journal, 30, 2*, 96-113.

Burgoon, J. K., & Hale, J. L. (1984). The fundamental topoi of relational communication. *Communication Monographs, 51*, 193-214.

Burgoon, J. K., Buller, D. B., Hale, J. L., & de Turck, M. A. (1984). Relational messages associated with nonverbal behaviors. *Human Communication Research, 10*, 351-378.

Camden, C, & Verba, S. (1986). Communication and consciousness: Applications in marketing. *Western Journal of Speech Communication, 50*, 64-73.

Campbell, R.S., & Pennebaker, J.W. (2003). The secret life of pronouns: Flexibility in writing style and physical health. *Psychological Science, 14*, 60-65.

Cappella, J. N. (1983). Conversational involvement: Approaching and avoiding others. In J. M. Wiemann & R. P. Harrison (Eds.), *Nonverbal interaction* (pp. 113-148). Newbury Park, CA. Sage.

Cegala, D. J. (1989). A study of selected linguistic components of involvement in interaction. *Western Journal of Speech Communication, 53,* 311-326.

Cegala, D. J. (1984). Affective and cognitive manifestation of interaction involvement during unstructured and competitive interactions. *Communication Monographs*, 51, 320-337.

Cegala, D. J. (1981). Interaction involvement: A cognitive dimension of communicative competence. *Communication Education, 30, 2,* 109-121.

Cegala, D. J. & Sillars, A. L. (1989). Further examination of non-verbal manifestations of interaction involvement. *Communication Reports, 2, 1,* 39-47.

Cegala, D. J., Savage, G. T., Brunner, C. C., & Conrad, A. (1982). An elaboration of the meaning of interaction involvement: Toward the development of a theoretical concept. *Communication Monograghs, 49,* 229-248.

Chen, L. (1995). Interaction involvement and patterns of topical talk: A comparison of intercultural and intracultural dyads. *International Journal of Intercultural Relations, 19,* 463-482.

Chua, E. G. & Gudykunst, W. B. (1987). Conflict resolution styles in low- and high-context cultures. *Communication Research Report, 4, 1,* 32-37.

Clark, H. H. (2004). Pragmatics of language performance. In L. R. Horn & G. Ward (Eds.), *Handbook of pragmatics*. Oxford: Blackwell, pp. 365-382.

Coker, D. A., & Burgoon, J. K. (1987). The nature of conversational involvement and non-verbal encoding patterns. *Human Communication Research*, *13, 4*, 463-494.

Convertino, G., Mentis, H., Rosson, M. B., Carroll, J., Slavkovic, A., & Ganoe, C. (2008). Articulating common ground in cooperative work: content and process. *Proceedings of CHI 2008*, 1637-1646.

Edinger, J. A., & Patterson, M. L. (1983). Nonverbal involvement and social control. *Psychological Bulletin, 93, 1*, 30-56.

Erickson, T., Smith, D., Kellogg, W., Laff, M., Richards, J. and Bradner, E (1998). Socially Translucent Systems: Social Proxies, Persistenct Conversation and the Design of "Babble". *Proceedings of CHI 1998*, 72-79.

Gergle, D., Millen, D., Kraut, R., & Fussell, S. (2004). Persistence Matters: Making the Most of Chat in Tightly-Coupled Work. *Proceedings of CHI 2004*, 431-438.

Gudykunst, W. B., Matsumoto, Y., Ting-Toomey, S., Nishida, T., Kim, K., & Heyman, S. (1996). The influence of cultural individualism-collectivism, self construals, and individual values on communication styles across cultures. *Human Communication Research*, 22, 510.

Guerrero, L. K., & Burgoon, J. K. (1996). Attachment styles and reactions to nonverbal involvement change in romantic dyads: Patterns of reciprocity and compensation. *Human Communication Research, 22, 3*, 335-370.

Goffman, E. (1967). *Interaction rituals: Essays on face-to-face behaviors*, New Brunswick, NJ: Aldine.

Guillory, J., Spiegel, J., Drislane, M., Weiss, B., Donner, W., & Hancock, J. (2011). Upset now?: emotion contagion in distributed groups. *Proceedings of CHI 2011*, 745-748.

Hall, E. T. (1976). *Beyond culture*. Garden City, N.Y.: Anchor Press.

Hancock, J., Currya, J., Goorhaa, S. & Woodworth, M (2007). On Lying and Being Lied To: A Linguistic Analysis of Deception in Computer-Mediated Communication. *Discourse Processes, 45, 1*, 1-23.

Herring, S. C. (2012). Grammar and electronic communication. In C. Chapelle (Ed.), Encyclopedia of applied linguistics. Hoboken, NJ: Wiley-Blackwell.

Herring, S. C. (2010). Who's got the floor in computer-mediated conversation? Edelsky's gender patterns revisited. *Language@Internet, 7,* article 8.

Holtgraves, T., & Yang, J.-N. (1992). Interpersonal underpinnings of request strategies: General principles and differences due to culture and gender. *Journal of Personality and Social Psychology, 62*, 246–256.

Isaacs, E., Walendowski, A., Whittaker, S., Schiano, D., & Kamm, C. (2002). The character, functions, and styles of instant messaging in the workplace. *Proceedings of CSCW 2002*, 11-20.

Jones, E., Gallois, C., Callan, V., & Barker, M. (1999). Strategies of accommodation: Development of a coding system for conversational interaction. *Journal of Language and Social Psychology, 18*, 123-152.

Kiesler, S., Siegel, J., & McGuire, T.W. (1984). Social psychological aspects of computer-mediated communication. *American Pyschologist, 39*, 1123-1134.

Kim, M.-S., Hunter, J. E., Miyahara, A., Horvarth, A.-M., Bresnahan, M., & Yoon, H.-J. (1996). Individual vs. culture-level dimensions of individualism and

collectivism: Effects of preferred conversational styles. *Communication Monographs, 63,* 29–49.

Oetzel, J., Ting-Toomey, S., Masumoto, T., Yokochi, Y., Pan, X., Takai, J., et al. (2001). Face and facework in conflict: A cross-cultural comparison of China, Germany, Japan, and the United States. *Communication Monographs, 68,* 235–258.

Kramer, A.D.I, Fussell, S. R., & Setlock, L. D. (2004) Text analysis as a tool for analyzing conversation in online support groups. *CHI 2004 Late Breaking Results*.

LaFrance, M. & Mayo, C. (1978). Cultural aspects of nonverbal communication. *International Journal of Intercultural Relations, 2, 1*, 71-89.

Leshed, G., Perez, D., Hancock, J., Cosley, D., Birnholtz, J., Lee, S., McLeod, P., & Gay, G. (2009). Visualizing real-time language-based feedback on teamwork behavior in computer-mediated groups. *Proceedings of CHI 2009*, 537-546.

Lowry, P. B., Roberts, T. L., Romano, N. C. Jr., Cheney, P. D., & Hightower, R. (2006). The Impact of Group Size and Social Presence on Small-Group Communication: Does Computer-Mediated Communication Make a Difference? *Small Group Research, 37,* 631-661.

McCarthy, A., Lee, K., Itakura, S., & Muir, D. W. (2008). Gaze Display When Thinking Depends on Culture and Context. *Journal of Cross-Cultural Psychology, 39, 6*, 716-729.

McLeod, P. L. (2011). Effects of Anonymity and Social Comparison of Rewards on Computer-Mediated Group Brainstorming. *Small Group Research, 42*, 475-503.

McLeod, P.L., & Kettner-Polley, R.B. (2004). Con- tributions of psychodynamic theories to understanding small groups. *Small Group Research, 35, 3,* 333-361.

Mehrabian, A. (1967). Attitudes inferred from non-immediacy of verbal communications. *Journal of Verbal Learning and Verbal Behavior, 6*, 294-305.

Mehrabian, A., & Wiener, M. (1966). Non-immediacy between communicator and object of communication in a verbal message: Application to the inference of attitudes. *Journal of Consulting Psychology, 30*, 420-425.

Nguyen, D., & Fussell, S. (2012). How did you feel during our conversations: Retrospective analysis of intercultural and same-culture instant messaging conversations. *Proceedings of CSCW 2012,* 117-126.

Norton, R. W. (1983). *Communication styles: Theory, applications and methods.* Beverly Hills, CA: Sage.

Osgood, C. E. (1971). Where do sentences come from? In D. Steinberg & L. Jakobovits (Eds.), *Semantics: An interdisciplinary reader in philosophy, linguistics, and psychology* (pp. 497-525). Cambridge: Cambridge University Press.

Patterson, M. L. (1983). *Nonverbal behavior: A functional perspective*. New York: Springer-Verlag.

Patterson, M. L. (1982). A sequential functional model of nonverbal exchange. *Psychological Review, 89, 3*, 231-249.

Pennebaker, J.W., & Francis, M.E. (1999). *Linguistic Inquiry and Word Count: LIWC [software program for text analysis]*. Lawrence Erlbaum Associates.

Pirzadeh, A. & Pfaff, M. (2012). Expression of emotion in IM. *Proceedings of CSCW 2012*, 199-202.

Tao, H. Y., & Thompson, S. A. (1991). English backchannels in Mandarin conversations: A case study of superstratum pragmatic ‘‘interference’’. *Journal of Pragmatics, 16*, 209–233.

Tidwell, L. & Walther, J. (2002). Computer mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research, 28, 3*, 317-348.

Triandis, H. C. (1995). *Individualism and Collectivism*. Boulder, CO: Westview.

Robertson, D. (2000). Variability in the use of the English article system by Chinese learners of English. *Second Language Research, 16, 2*, 135-172.

Scheerhorn, D. R. (1991). Politeness in decision-making. *Research on Language and Social Interaction, 25*, 253-273.

Setlock, L. D., Quinones, P. A., & Fussell, S. R. (2007). Does culture interact with media richness? The effects of audio vs. video conferencing on Chinese and American dyads. *Proceedings of HICSS 2007.*

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London, England: John Wiley.

Stewart, C. O., Setlock, L. D., & Fussell, S. R. (2007). Conversational argumentation in decision-making: Differences across cultures and communication media. *Discourse Processes, 44*, 113-139.

Straus, S. G. (1996). Getting a Clue: The Effects of Communication Media and Information Distribution on Participation and Performance in Computer-Mediated and Face-to-Face Groups. *Small Group Research, 27,* 115-142.

Xu, Q., Li, L., & Wang, G. (2013). Designing engagement-aware agents for multiparty conversations. *Proceedings of CHI 2013*, 2233-2242.

Villaume, W. A. (1988).Interaction involvement and the use of referential and formal anaphora in conversation. *Language and Speech, 31*, *4,* 357-378.

Villaume, W. A., Jackson, J., & Schouten, T. G. (1989). Issue-even extensions and interaction involvement: Text-based and meaning-based discourse strategies. *Human Communication Research, 15, 3*, 407-427.

Villaume, W.A. & Cegala, D. J. (1988). Interaction involvement and discourse strategies: The patterned use of cohesive devices in conversation. *Communication Monographs, 55*, 20-40.

Voida, A., Newstetter, W., & Mynatt, E. (2002). When conventions collide: the tensions of instant messaging attributed. *Proceedings of CHI 2002*, 187-194.

Walls, J. (1993). Global networking for local development: Task focus and relationship focus in cross culture communication. In L. M. Harasim (Ed.), *Global networks: Computers and international communication*. Cambridge, MA: MIT Press.

Walther, J. B., Loh, T., & Granka, L. (2005). Let Me Count the Ways : The Interchange of Verbal and Nonverbal Cues in Computer-Mediated and Face-to-Face Affinity. *Journal of Language and Social Interaction, 24, 1,* 24-36.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*, 3–43.

Walther, J. B., & Burgoon, J. K. (1992). Relational communication in Computer-Mediated Interaction. *Human Communication Research, 19, 1,* 50-88.

Wiener, M., & Mehrabian, A. (1968). *Language within language: Immediacy, a channel in verbal communication.* New York: Appleton-Century-Crofts.

Wang, H-C., Fussell, S. R. & Setlock, L. D. (2009). Cultural difference and adaptation of communication styles in computer-mediated group brainstorming. *Proceedings of CHI 2009,* 669-678.